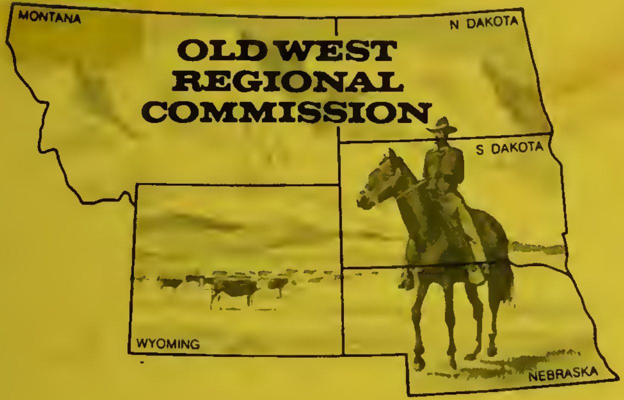
S Energy Research
333.805 Information System
O7eris quarterly report
V.1, No.1

MONTANA STATE LIBRARY
930 East Lyndale Avenue
Helena, Montana 59601



ENERGY RESEARCH INFORMATION SYSTEM

Quarterly Report

Vol. 1, No. 1
November 1975

A Joint Program of:

The Old West Regional Commission
and
USDA Forest Service, Surface
Environment and Mining

Billings, Montana

SURFACE ENVIRONMENT & MINING
SEAM
PROGRAM

Montana State Library
3 0864 1004 5636 0

MONTANA STATE LIBR
930 East Lyndale Avenu
Helena, Montana 596

ENERGY RESEARCH INFORMATION SYSTEM

QUARTERLY REPORT

Vol. 1, No. 1

Old West Regional Commission
and
USDA Forest Service, Surface Environment and Mining

Billings, Montana
November 1975

Prepared by:

Beth Givens and Cathy Boyd
Information Specialists
Old West Regional Commission
Fratt Building, Suite 306A
Billings, Montana 59101

with the technical
assistance of:

Neil Allen and Mary Lyon
U.S. Forest Service
Surface Environment & Mining
145 Grand Ave.
Billings, Montana 59102

and

Richard Neeves, Programmer
ABP Branch
U.S. Forest Service
324 25th St.
Ogden, Utah 84401

TABLE OF CONTENTS

Introduction....................i

Reporting Form....................iv

1.0 Coal....................1
    1.1 General....................1
    1.2 Reclamation....................6
    1.3 Water Resources....................42
    1.4 Atmospheric & Bioenvironmental Studies....................66
    1.5 Social & Economic Studies....................89
    1.6 Energy Conversion & Transport....................104
    1.7 Mining & Extraction Methodology....................110
    1.8 Other....................113

2.0 Petroleum, Natural Gas, and Oilshale....................114

3.0 Alternate Energy Resources....................123

4.0 Nuclear Energy....................127

5.0 Other Mined Resources....................128

6.0 Energy Conversion/Consumer Aspects....................135

7.0 Land Use....................136

8.0 Other....................143

Location Index..150
Personal Name Index...153
Organization Index..182
Subject Index...198

INTRODUCTION

The Energy Research Information System (ERIS) is a cooperative program of the Old West Regional Commission (OWRC) and the U.S. Department of Agriculture, Forest Service, Surface Environment and Mining (SEAM). The Old West Regional Commission is a Federal-State partnership whose function is to stimulate programs for orderly economic growth and development in the states of Montana, Nebraska, North Dakota, South Dakota, and Wyoming. Established in 1972 under the Public Works and Economic Development Act of 1965, it is one of seven such Commissions in the United States. Its offices are located in Washington, D.C., Rapid City, South Dakota, and Billings, Montana. The SEAM program provides and applies technology in order to maintain or restore the quality of the environment and surface values of forests and rangelands subject to mining. SEAM offices are also located in Billings, Montana.

The objective of ERIS is to compile and make available to the energy research users of the region an up-to-date inventory of ongoing and recently completed energy-related research projects. By providing researchers with a means of communication with other researchers and allowing government and policy decision-makers easy access to regional energy research, ERIS aims to improve communication channels for energy research users, thus helping to prevent research duplication and pinpointing areas for additional research. Through periodic publication and distribution of system holdings in the form of a Quarterly Report, users of this information---researchers, funding agencies, government agencies, industry and public interest groups---have access to regional energy information.

ERIS Scope

The term "energy-related" covers a broad spectrum of activities and encompasses a large volume of research. Nonetheless, ERIS is an attempt to report energy-related research projects in as comprehensive a manner as possible. This includes socioeconomic and alternate energy resource studies, and programs related to energy development which do not necessarily involve research, as well as reclamation, energy conversion and land use studies.

The geographic focus of ERIS is upon research conducted in the Old West

Region. Research outside of the Region is included when it is offered by the reporting agency as being applicable to research efforts or developments within the Region.

This first Quarterly Report of system holdings is by no means comprehensive in coverage. Subsequent issues will serve not only to update this first publication, but also to fill in the gaps - most notably - the research activities of industry and public interest groups. This issue does contain, however, comprehensive coverage of the energy-related research activities of both the Old West Regional Commission and SEAM.

The compilation of energy research projects in the first Quarterly Report has been accomplished by combining ERIS's own information-gathering efforts with those of other clearinghouses -- most notably, the Oak Ridge National Laboratory's "Inventory of Current Energy Research and Development," the U.S. Dept. of Agriculture's "Current Research Information System," the Montana Energy Advisory Council, the South Dakota Office of Energy Policy, and the various energy agencies of Wyoming, North Dakota and Nebraska. The differences in data-categories which are reported by the already-existent clearinghouses are reflected in the varying formats of the research projects included in the first Quarterly Report. For the most part, however, data categories are similar to those used on the ERIS Reporting Form, reproduced following the Introduction.

Use of the ERIS Quarterly Report

The research projects included in the Quarterly Report are categorized by broad subject areas, or chapters. For example, "Coal" is broken down into eight chapters dealing with specific subjects such as Reclamation, Social and Economic Studies and Water Resources. In addition, further access is provided by four indexes - subject, location, organization, and personal name. The following are suggestions which may help you in the use of the indexes:

The Location Index utilizes the 2-letter abbreviations for states' names, i.e. MT for Montana, WY for Wyoming, etc.

The Personal Name Index contains the personal names of the investigators, supervisors, sponsors, and authors of publications for each project.

Government agencies listed in the Organization Index are prefaced by either the state's name or "U.S. ...", for example, South Dakota Office of Energy Policy, and U.S. Surface Environment and Mining.

The Subject Index is the keyword list that can be used in conducting system

searches. If a user wishes to conduct a manual search of the system using the Subject Index, it is recommended that a combination of general and specific terms be used. As an example, if the user is trying to identify all projects on the effects of mining on the rangeland environment, the user should consult "rangeland ecology," but may find additional references under the broad term "bioenvironment."

Computer Search Service

The holdings of ERIS are computerized, allowing for flexibility in conducting special searches of the data file. Each of the data categories in the Reporting Form (reproduced on the following pages) or any combination of categories can be used to formulate a computer search. The system also has the capability to search complete files including the abstract for more specific terms of the user's choice. This service is offered as a complement to the Quarterly Report and allows more complete access to the holdings of ERIS.

If your inquiry concerning energy research cannot be answered by using the Quarterly Report, contact a member of the ERIS staff and request that a search be conducted. The staff will send you copies of all projects on your desired subject. The time involved in performing the search, compiling the projects and mailing is anticipated to be less than one week. Until the demand for computer searches can be determined, there will be no charge for this service.

Please direct your inquiries to: Beth Givens or Cathy Boyd, ERIS, Old West Regional Commission, Fratt Building, Suite 306A, Billings, MT 59101. 406-245-6711 x6665 (commercial). 406-585-6665 (FTS).

Acknowledgements

The information-gathering effort for the Energy Research Information System involves the cooperation of many individuals and organizations. We would like to thank those who have contributed research project information and support. In addition, the ERIS staff gratefully acknowledges the special contributions of the following: Neil Allen, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado; Gloria Caton, Oak Ridge National Laboratory; Bruce DeBoer and Mark Smith, South Dakota Offic of Energy Policy; Tim Dye and staff, Fort Collins Computer Center, U.S. Forest Service; William Johnson, North Dakota Regional Environmental Assessment Program Mary Lyon, U.S. Forest Service, Custer National Forest; John Myers, U.S. Dept. o Agriculture, Current Information Research System; Richard Neeves, U.S. Forest Service, Ogden, Utah; James Nybo, Montana Energy Advisory Council; Richard Rouillier and Phylis Kaiser, U.S. Forest Service, Region 1 Office.

Region. Research outside of the Region is included when it is offered by the reporting agency as being applicable to research efforts or developments within the Region.

This first Quarterly Report of system holdings is by no means comprehensive in coverage. Subsequent issues will serve not only to update this first publication, but also to fill in the gaps - most notably - the research activities of industry and public interest groups. This issue does contain, however, comprehensive coverage of the energy-related research activities of both the Old West Regional Commission and SEAM.

The compilation of energy research projects in the first Quarterly Report has been accomplished by combining ERIS's own information-gathering efforts with those of other clearinghouses -- most notably, the Oak Ridge National Laboratory's "Inventory of Current Energy Research and Development," the U.S. Dept. of Agriculture's "Current Research Information System," the Montana Energy Advisory Council, the South Dakota Office of Energy Policy, and the various energy agencies of Wyoming, North Dakota and Nebraska. The differences in data-categories which are reported by the already-existent clearinghouses are reflected in the varying formats of the research projects included in the first Quarterly Report. For the most part, however, data categories are similar to those used on the ERIS Reporting Form, reproduced following the Introduction.

Use of the ERIS Quarterly Report

The research projects included in the Quarterly Report are categorized by broad subject areas, or chapters. For example, "Coal" is broken down into eight chapters dealing with specific subjects such as Reclamation, Social and Economic Studies and Water Resources. In addition, further access is provided by four indexes - subject, location, organization, and personal name. The following are suggestions which may help you in the use of the indexes:

The Location Index utilizes the 2-letter abbreviations for states' names, i.e. MT for Montana, WY for Wyoming, etc.

The Personal Name Index contains the personal names of the investigators, supervisors, sponsors, and authors of publications for each project.

Government agencies listed in the Organization Index are prefaced by either the state's name or "U.S. ...", for example, South Dakota Office of Energy Policy, and U.S. Surface Environment and Mining.

The Subject Index is the keyword list that can be used in conducting system

searches. If a user wishes to conduct a manual search of the system using the Subject Index, it is recommended that a combination of general and specific terms be used. As an example, if the user is trying to identify all projects on the effects of mining on the rangeland environment, the user should consult "rangeland ecology," but may find additional references under the broad term "bioenvironment."

Computer Search Service

The holdings of ERIS are computerized, allowing for flexibility in conducting special searches of the data file. Each of the data categories in the Reporting Form (reproduced on the following pages) or any combination of categories can be used to formulate a computer search. The system also has the capability to search complete files including the abstract for more specific terms of the user's choice. This service is offered as a complement to the Quarterly Report and allows more complete access to the holdings of ERIS.

If your inquiry concerning energy research cannot be answered by using the Quarterly Report, contact a member of the ERIS staff and request that a search be conducted. The staff will send you copies of all projects on your desired subject. The time involved in performing the search, compiling the projects and mailing is anticipated to be less than one week. Until the demand for computer searches can be determined, there will be no charge for this service.

Please direct your inquiries to: Beth Givens or Cathy Boyd, ERIS, Old West Regional Commission, Fratt Building, Suite 306A, Billings, MT 59101. 406-245-6711 x6665 (commercial). 406-585-6665 (FTS).

Acknowledgements

The information-gathering effort for the Energy Research Information System involves the cooperation of many individuals and organizations. We would like to thank those who have contributed research project information and support. In addition, the ERIS staff gratefully acknowledges the special contributions of the following: Neil Allen, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado; Gloria Caton, Oak Ridge National Laboratory; Bruce DeBoer and Mark Smith, South Dakota Office of Energy Policy; Tim Dye and staff, Fort Collins Computer Center, U.S. Forest Service; William Johnson, North Dakota Regional Environmental Assessment Program; Mary Lyon, U.S. Forest Service, Custer National Forest; John Myers, U.S. Dept. of Agriculture, Current Information Research System; Richard Neeves, U.S. Forest Service, Ogden, Utah; James Nybo, Montana Energy Advisory Council; Richard Rouillier and Phylis Kaiser, U.S. Forest Service, Region 1 Office.

Region. Research outside of the Region is included when it is offered by the reporting agency as being applicable to research efforts or developments within the Region.

This first Quarterly Report of system holdings is by no means comprehensive in coverage. Subsequent issues will serve not only to update this first publication, but also to fill in the gaps - most notably - the research activities of industry and public interest groups. This issue does contain, however, comprehensive coverage of the energy-related research activities of both the Old West Regional Commission and SEAM.

The compilation of energy research projects in the first Quarterly Report has been accomplished by combining ERIS's own information-gathering efforts with those of other clearinghouses -- most notably, the Oak Ridge National Laboratory's "Inventory of Current Energy Research and Development," the U.S. Dept. of Agriculture's "Current Research Information System," the Montana Energy Advisory Council, the South Dakota Office of Energy Policy, and the various energy agencies of Wyoming, North Dakota and Nebraska. The differences in data-categories which are reported by the already-existent clearinghouses are reflected in the varying formats of the research projects included in the first Quarterly Report. For the most part, however, data categories are similar to those used on the ERIS Reporting Form, reproduced following the Introduction.

Use of the ERIS Quarterly Report

The research projects included in the Quarterly Report are categorized by broad subject areas, or chapters. For example, "Coal" is broken down into eight chapters dealing with specific subjects such as Reclamation, Social and Economic Studies and Water Resources. In addition, further access is provided by four indexes - subject, location, organization, and personal name. The following are suggestions which may help you in the use of the indexes:

The Location Index utilizes the 2-letter abbreviations for states' names, i.e. MT for Montana, WY for Wyoming, etc.

The Personal Name Index contains the personal names of the investigators, supervisors, sponsors, and authors of publications for each project.

Government agencies listed in the Organization Index are prefaced by either the state's name or "U.S. ...", for example, South Dakota Office of Energy Policy, and U.S. Surface Environment and Mining.

The Subject Index is the keyword list that can be used in conducting system

searches. If a user wishes to conduct a manual search of the system using the Subject Index, it is recommended that a combination of general and specific terms be used. As an example, if the user is trying to identify all projects on the effects of mining on the rangeland environment, the user should consult "rangeland ecology," but may find additional references under the broad term "bioenvironment."

Computer Search Service

The holdings of ERIS are computerized, allowing for flexibility in conducting special searches of the data file. Each of the data categories in the Reporting Form (reproduced on the following pages) or any combination of categories can be used to formulate a computer search. The system also has the capability to search complete files including the abstract for more specific terms of the user's choice. This service is offered as a complement to the Quarterly Report and allows more complete access to the holdings of ERIS.

If your inquiry concerning energy research cannot be answered by using the Quarterly Report, contact a member of the ERIS staff and request that a search be conducted. The staff will send you copies of all projects on your desired subject. The time involved in performing the search, compiling the projects and mailing is anticipated to be less than one week. Until the demand for computer searches can be determined, there will be no charge for this service.

Please direct your inquiries to: Beth Givens or Cathy Boyd, ERIS, Old West Regional Commission, Fratt Building, Suite 306A, Billings, MT 59101. 406-245-6711 x6665 (commercial). 406-585-6665 (FTS).

Acknowledgements

The information-gathering effort for the Energy Research Information System involves the cooperation of many individuals and organizations. We would like to thank those who have contributed research project information and support. In addition, the ERIS staff gratefully acknowledges the special contributions of the following: Neil Allen, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado; Gloria Caton, Oak Ridge National Laboratory; Bruce DeBoer and Mark Smith, South Dakota Office of Energy Policy; Tim Dye and staff, Fort Collins Computer Center, U.S. Forest Service; William Johnson, North Dakota Regional Environmental Assessment Program; Mary Lyon, U.S. Forest Service, Custer National Forest; John Myers, U.S. Dept. of Agriculture, Current Information Research System; Richard Neeves, U.S. Forest Service, Ogden, Utah; James Nybo, Montana Energy Advisory Council; Richard Rouillier and Phylis Kaiser, U.S. Forest Service, Region 1 Office.

REPORTING FORM:

Date

REPORTING FORM:
ENERGY RESEARCH INFORMATION SYSTEM
Old West Regional Commission

Date ____________

Respondent:

Please complete the relevant categories of the Reporting Form for each energy-related project currently being conducted or recently completed by your organization. If an umbrella project covers several separate studies, fill out a form for each one, as well as for the umbrella project. If you want any of the information you provide to be omitted from Information System publications, make a note of this in Category 16, "Special Instructions for Proprietary Information."

In order to assist us in assigning keywords for computer access to your research information, we ask that you circle the most descriptive words and phrases of the Title and Abstract.

Please return completed Reporting Form(s) to: Beth Givens, Old West Regional Commission, Fratt Building Suite 306A, Billings, MT 59101. 406 - 245-6711 x6665.

Additional Reporting Forms can be obtained from this address.

We sincerely appreciate your cooperation in this effort.

---

1. KW (please leave blank)

2. Project/Program Title (please circle key words) ____________________

3. Project/Program Number (descriptive number used by your organization) ____________

4. Principal Investigators (include organization name if different from 5 below)

____________________ Phone Number _____ ____________

____________________ Phone Number _____ ____________

____________________ Phone Number _____ ____________

5. Project Supervisor (individual and organization which oversee all facets of project or program through its completion)

Supervisor ____________________

Organization ____________________

Address ____________________

Phone Number _____ ____________

and/or resources; does not provide primary source funding and may or may not conduct research itself)

Organization ____________________

Project Monitor ____________________

Address ____________________

____

Phone Number _____ __________

7. Primary Sponsor (organization which provides funds)

Organization ____________________

Project Monitor ____________________

Address ____________________

____

Phone Number _____ __________

8. Secondary Sponsor

Organization ____________________

Project Monitor ____________________

Address ____________________

____

Phone Number _____ __________

(provide additional sponsor information on separate sheet)

9. Primary Funding Amount (please complete A and one section of B if applicable)

A. Total amount: $__________ for ______ yrs. ______ mos.

B. Amount per year: $__________ per yr. for ______ yrs. beginning ____ ____ ____
mo. day yr.

OR $__________ for the yr. ______ $__________ for the yr. ______

$__________ for the yr. ______ $__________ for the yr. ______

10. Secondary Funding Amount (please complete A and one section of B if applicable)

A. Total amount: $__________ for ______ yrs. ______ mos.

B. Amount per year: $__________ per yr. for ______ yrs. beginning ____ ____ ____
mo. day yr.

OR $__________ for the yr. ______ $__________ for the yr. ______

$__________ for the yr. ______ $__________ for the yr. ______

(provide additional funding information on separate sheet)

11. Time Frame: Starting Date ____ ____ ____ Ending Date ____ ____ ____

(mo.) (day) (yr.) (mo.) (day) (yr.)

12. Status: Actual Completion Date of Project (leave blank if not completed)

____ ____ ____

(mo.) (day) (yr.)

13. Location: States/Counties/City/Township/Range/Section (please enter appropriate location designation for this study)

States ____________________

Other ____________________

14. Abstract: Problems, Objectives, and Approach (in free form, 300 words maximum)
PLEASE CIRCLE KEY WORDS AND PHRASES.

report number, date, issuing agency, and where report can be obtained)

16. Special Instructions for Proprietary Information (enter category numbers and information which you desire to be omitted from published materials)

17. Type of Study (please check all that apply)

- I. ☐ Primary Data Sources
  - A. ☐ Field Study
  - B. ☐ Lab. Study
  - C. ☐ Both A and B
- II. ☐ Secondary Data Sources
- III. ☐ Both A and B
- IV. ☐ Program Not Involving Research (for example, an energy-related community assistance program)
- V. A. ☐ The study described on this Reporting Form is an umbrella project or program. It encompasses two (2) or more separate studies which are subcontracted and/or of differing subject content.
  - B. ☐ The study described on this Reporting Form is a part of an umbrella project or program entitled:

    ____

    ____

    (The Cooperator is recorded in Category 6, above)
  - C. ☐ The study is a separate project or program in and of itself.

Thank you for completing this Reporting Form. Please call or write if you have questions and comments.

r.7/75

00000001
PROJECT TITLE:
REGIONAL STUDIES PROGRAM
PROJECT NUMBER:
65502-00
INVESTIGATORS:
L. HOOVER; R. CARTER
PROJECT SUPERVISOR:
L. JOHN HOOVER
ARGONNE NATIONAL LABORATORY, EES DIVISION
BUILDING 12
ARGONNE, ILLINOIS 60439
312-739-7711 x5137
PRIMARY SPONSOR:
U. S. ERDA, DIV. OF BIOMEDICAL & ENV. RESEARCH
JEFF SWINEBROAD
WASHINGTON, D. C. 20545
301-973-3571
PRIMARY FUNDING AMOUNT:
200,000
REPRESENTS A PORTION OF TOTAL CONTRACT FOR 895K THAT WILL FOCUS ON NGP.
TIME FRAME:
07 01 74 TO INDEFINITE
LOCATION:
MT ND SD
ABSTRACT:
THE ARGONNE PROGRAM WILL FOCUS ON GEOGRAPHICALLY SENSITIVE ENERGY SUPPLY PROBLEMS, ISSUES AND OPTIONS ASSOCIATED WITH SURFACE MINING, COAL CONVERSION AND ELECTRIC POWER PLANT SITING, UTILIZATION OR DEPLETION OF CRITICAL ENERGY-RELATED NATURAL RESOURCES, AND THE EFFECTS OF EXPOSING SENSITIVE REGIONAL POPULATIONS AND ECOSYSTEMS TO SPECIFIC ENERGY EFFLUENTS.
REPORTS AND PUBLICATIONS:
1. REGIONAL ENERGY ANALYSIS: AN EVALUATION OF ALTERNATIVE APPROACHES.
2. SITE: A METHODOLOGY FOR ENERGY FACILITY SITE SCREENING AND REGIONAL ENVIRONMENTAL IMPACT ASSESSMENT
3. REGIONAL STUDIES ADVISORY BOARD RESEARCH RECOMMENDATIONS
4. FORECASTING THE LOCAL ECONOMIC IMPACTS OF ENERGY RESOURCE DEVELOPMENT: A METHODOLOGICAL APPROACH

00000002
PROJECT TITLE:
AN ASSESSMENT OF COAL DEVELOPMENT IN WESTERN SOUTH DAKOTA
PROJECT SUPERVISOR:
NEAL F. JACQUOT
6TH DISTRICT COUNCIL OF LOCAL GOVERNMENTS
P. O. BOX 1586
RAPID CITY, SD
605-342-8241
COOPERATOR/COORDINATOR:
SOUTH DAKOTA STATE PLANNING BUREAU
STATE CAPITOL BLDG.
PIERRE, SD 57501
605-224-3661
PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
201 MAIN ST. SUITE D
RAPID CITY, SD 57701
605-348-6310
PRIMARY FUNDING AMOUNT:
7,000
SECONDARY FUNDING AMOUNTS:
4,875
TIME FRAME:
06 01 74 TO 06 01 75
LOCATION:
SD
ABSTRACT:
GRANTEE SHALL ASSESS INFORMATION AND RESEARCH COAL MINING AND RELATED DEVELOPMENTS FROM INFORMATION AVAILABLE FROM STATE AND FEDERAL AGENCIES TO INCLUDE: 1. THE INTERIM REPORT AND WORK GROUP REPORTS OF NORTHERN GREAT PLAINS RESOURCES PROGRAM; 2. RESEARCH FUNDED BY OLD WEST REGIONAL COMMISSION; 3. RESEARCH CONDUCTED BY FEDERAL AGENCIES INCLUDING EPA, USGS, NSF, DEPT. OF AGRICULTURE, AND BUREAU OF RECLAMATION.
GRANTEE SHALL DETERMINE PLANS OF COMPANIES WITH RESPECT TO: 1. COAL DEVELOPMENT; 2. STEAM ELECTRIC GENERATING PLANTS; 3. COAL GASIFICATION; 4. WATER WITHDRAWLS IN DISTRICT.
GRANTEE SHALL REPORT TO PUBLIC STATEMENT OF COAL IMPACT ON AIR QUALITY, WATER QUALITY AND QUANTITY, AND USE AND SOCIOECONOMIC IMPACT.
GRANTEE SHALL OUTLINE AREAS WHERE CURRENT RESEARCH IS DEFICIENT.

00000003
PROJECT TITLE:
COAL DEVELOPMENT - A PRELIMINARY ASSESSMENT
INVESTIGATORS:
PATRICK D. BISSELL
PROJECT SUPERVISOR:
DENNIS W. POTTER
FIFTH DISTRICT PLANNING AND DEVELOPMENT COMMISSION
P.O. BOX 640
PIERRE, SD 57501
605-224-1623
COOPERATOR/COORDINATOR:
SOUTH DAKOTA STATE PLANNING BUREAU

HARLEY T. DUNCAN
STATE PLANNING BUREAU, STATE CAPITOL
PIERRE, SD 57501
605-224-3661

PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
201 MAIN ST. - SUITE D
RAPID CITY, SD 57701
605-348-6310

PRIMARY FUNDING AMOUNT:
5,000

TIME FRAME:
07 01 74 TO 06 30 75

STATUS:
COMPLETED 04 30 75

LOCATION:
SD

ABSTRACT:

THE PURPOSE OF THIS STUDY IS TO REVIEW AND COMMENT UPON THE IMPACTS OF COAL AND RELATED DEVELOPMENTS, IN THE NORTHERN GREAT PLAINS, AS THEY INFLUENCE THE FIFTH DISTRICT OF SOUTH DAKOTA.

THE STUDY IS DIVIDED INTO THREE PARTS: I. FUTURE DEVELOPMENT PLANS, II. RESULTS OF COAL IMPACT RESEARCH, III. AREAS OF RESEARCH DEFICIENCY. IN PART I, DEVELOPMENT PLANS FOR THE COAL REGION ARE DISCUSSED, INCLUDING: COAL MINING, STEAM/ELECTRICAL POWER GENERATION, COAL GASIFICATION AND WATER WITHDRAWALS. IN PART II, RESULTS OF ALREADY COMPLETED RESEARCH ARE IDENTIFIED IN THE AREAS OF AIR QUALITY, WATER QUALITY AND QUANTITY, LAND USE AND THE SOCIO-ECONOMIC SYSTEM. IN PART III, DEFICIENCES IN RESEARCH ARE NOTED, INCLUDING BUT NOT LIMITED TO THE LACK OF INFORMATION ON THE SECONDARY IMPACTS OF COAL DEVELOPMENT. IN THIS SECTION, QUESTIONS REGARDING THE LACK OF RESEARCH ON THE EFFECTS OF UHV-ELECTRICAL TRANSMISSION, WATER QUALITY AND QUANTITY, LAND USE AND THE SOCIO-ECONOMIC IMPACT UPON SOUTH DAKOTA'S FIFTH DISTRICT ARE RAISED. ANY AND ALL QUESTIONS OF THIS NATURE MUST BE ADDRESSED BEFORE SOUTH DAKOTA CAN CONDONE COAL RELATED DEVELOPMENTS IN NEIGHBORING STATES. FURTHER, IT IS NECESSARY TO COMPLETELY EXAMINE ALL SECONDARY AND TERTIARY EFFECTS OF COAL DEVELOPMENT.

TYPE OF STUDY:
PART OF SOUTH DAKOTA STATE INVESTMENT PLAN.

REPORTS AND PUBLICATIONS:
PATRICK D. BISSELL AND DENNIS W. POTTER. COAL DEVELOPMENT - A PRELIMINARY ASSESSMENT. FIFTH DISTRICT PLANNING AND DEVELOPMENT COMMISSION, PIERRE, SD.

0000004

PROJECT TITLE:
RECLAMATION OF STRIP MINED LANDS IN THE GREAT PLAINS

INVESTIGATORS:
JACK C. REED; EARL HOSKINS

PROJECT SUPERVISOR:
EARL HOSKINS
DEPT. OF MINING ENG.
SOUTH DAKOTA SCHOOL OF MINES & TECH.
RAPID CITY, SD 57701
605-394-2344

PRIMARY SPONSOR:
SOUTH DAKOTA SCHOOL OF MINES & TECH.

PRIMARY FUNDING AMOUNT:
7,816

TIME FRAME:
04 14 75 TO 04 17 75

LOCATION:
SD

ABSTRACT:

TO BRING ABOUT A BETTER UNDERSTANDING OF THE IMPACT OF OF ENERGY AND MINERALS DEVELOPMENT ON THE GREAT PLAINS AND THE PROBLEMS, POSSIBILITIES AND OPPORTUNITIES OF RECLAMATION OF OUR LAND AFTER STRIP MINING.

0000005

PROJECT TITLE:
REVIEW OF WYOMING COAL FIELDS, 1975

INVESTIGATORS:
GARY B. GLASS

PROJECT SUPERVISOR:
DANIEL N. MILLER
WYOMING STATE GEOLOGICAL SURVEY
P. O. BOX 3008, UNIV. STATION
LARAMIE, WY 82070

PRIMARY SPONSOR:
WYOMING GEOLOGICAL SURVEY

PRIMARY FUNDING AMOUNT:
15,000

TIME FRAME:
06 01 74 TO 02 01 75

STATUS:
COMPLETED 03 01 75

LOCATION:
WY

ABSTRACT:

THIS REPORT PRESENTS CURRENT PRODUCTION FIGURES OF WYOMING COAL MINES, ANALYSES OF TYPICAL COAL SAMPLES, LOCATION OF COAL FIELDS, PROJECTED PRODUCTION, DETAILS OF COAL FIELD GEOLOGY, AND FUTURE ACTIVITY ALONG WITH

NEW TECHNOLOGIES OF LIKELY IMPORTANCE.
REPORTS AND PUBLICATIONS:
REVIEW OF WYOMING COALFIELDS, 1975. GARY B. GLASS, WYOMING GEOLOGICAL SURVEY, MARCH 1974. 1.00. AVAILABLE FROM WYOMING GEOLOGICAL SURVEY.

00000006
PROJECT TITLE:
ENERGY RELATED RESEARCH OF UNDERGRADUATE CHEMISTRY MAJORS
PROJECT SUPERVISOR:
ROBERT J. HURTUBISE
UNIV. OF WYOMING, CHEMISTRY DEPT.
P.O. BOX 3354, UNIVERSITY STATION
LARAMIE, WY
307-766-6241
PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION
GAYLOR ELLIS, GRANTS OFFICER
WASHINGTON, DC 20550
PRIMARY FUNDING AMOUNT:
6,630
TIME FRAME:
06 01 75 TO 08 15 75
LOCATION:
WY
ABSTRACT:
FACULTY MEMBERS INVOLVED IN THIS PROGRAM ARE: R. OWEN ASPLUND--PROFESSOR OF CHEMISTRY.
RESEARCH PROJECT: ISOLATION AND IDENTIFICATION OF ORGANIC SMALL MOLECULES IN COAL
IT IS PROPOSED TO STUDY THE ORGANIC CONSTITUENTS OF COAL WITH SPECIAL EMPHASIS ON ORGANIC FUNCTIONAL COMPOUNDS. TWO STEPS ARE INVOLVED: SOLVENT EXTRACTION IN THE COLD MINERAL AND STEAM DISTILLATION. COAL SAMPLES WILL ALSO BE SUBJECTED TO STRUCTURAL ANALYSIS BY NMR, MASS SPECTROMETRY, IR AND UV.
ROLAND E. BARDEN, ASSISTANT PROFESSOR OF CHEMISTRY & BIOCHEMISTRY
RESEARCH PROJECT: SURFACTANT PROPERTIES OF PETROLEUM SULFONATES
THIS WORK INVOLVES THE PURIFICATION AND CHARACTERIZATION OF TWO ALKYLARYL SULFONATES AND LIGHT SCATTERING MEASUREMENTS. IT IS HOPED WE WILL LEARN WHETHER PHYSICAL PROPERTIES, SUCH AS CRITICAL MICELLE CONCENTRATION, MICELLE WEIGHT AND AGGREGATION NUMBER ARE SIGNIFICANTLY DIFFERENT FOR AN ALKYLARYL SULFONATE CONTAINING NAPHTHALEN AND AN ANALOG WHICH CONTAINS TETRAHYDRONAPHTHALENE (TETRALIN).
VERNON S. ARCHER, ASSOCIATE PROFESSOR OF CHEMISTRY (IN COLLABORATION WITH J. W. MURPHY OF THE GEOLOGY DEPT.)
RESEARCH PROJECT: DETERMINATION OF TRACE ELEMENTS IN COAL AND COAL ASH.
IF IS DESIRABLE TO DETERMINE PART-PER-BILLION CAPABILITIES FOR THESE ELEMENTS USING A MINIMAL NUMBER OF TREATMENTS AND SIMPLER INSTRUMENTATION SUCH AS THAT FOUND IN SMALLER ANALYTICAL LABORATORIES. THESE TECHNIQUES WILL INCLUDE PULSE POLAROGRAPHY, FLUORIMETRY, SPECIFIC ION POTENTIOMETRY, ATOMIC ABSORPTION, ATOMIC EMISSION AND UV-VISIBLE SPECTROPHOTOMETRY.
ROBERT J. HURTUBISE, ASSISTANT PROFESSOR OF CHEMISTRY
RESEARCH PROJECT: CHARACTERIZATION AND DETERMINATION OF SPECIFIC COMPONENTS IN SHALE OIL
IT IS OUR INTENT TO USE THIN-LAYER DENSITOMETRY AND LUMINESCENCE PROPERTIES OF SAMPLES, COLUMN AND THIN-LAYER CHROMATOGRAPHY. ATTEMPTS WILL ALSO BE MADE TO IDENTIFY AND DETERMINE SPECIFIC COMPOUNDS BY THEIR NATIVE FLUORESCENCE AND PHOSPHORESCENE.
SMITH L. HOLT, PROFESSOR OF CHEMISTRY
RESEARCH PROJECT: LINEAR CHAIN SYSTEMS
REPORTS AND PUBLICATIONS:
ASPLUND, R. OWEN, TUCKER AND HOLT, ´PREPARATION AND PROPERTIES OF FE3+-AMINE ACID COMPLEXES, CRYSTALLINE COMPLEXES WITH ALIPHATIC AMINO ACIDS.´ ARCH. BIOCHEM. BIOPHYS. 166 (1975).
BARDEN, ROLAND E., M.F. UTTER AND E.L. TAYLOR, ´PRYUVATE CARBOXYLASE: AN EVALUATION OF RELATIONSHIPS BETWEEN STRUCTURE AND MECHANISM AND BETWEEN STRUCTURE AND CATALYTIC ACTIVITY.´ ADV. IN ENZYMOLOGY 42, 1-72 (1974) (WILEY-INTERSCIENCE, NEW YORK)
HOLT, SMITH L., ASPLUND AND TUCKER, ´PREPARATION AND PROPERTIES OF FE3+-AMINE ACID COMPLEXES, CRYSTALLINE COMPLEXES WITH ALIPHATIC AMINO ACIDS.´ ARCH. BIOCHEM. BIOPHYS. 166 (1975).
HURTUBISE, ROBERT J. AND P.F. LOTT, ´INSTRUMENTATION FOR FLUORESCENCE AND PHOSPHORESCENCE (PARTS I AND II), J. CHEM. ED 51 (1974).

00000007
PROJECT TITLE:
NATURAL RESOURCE USE AND ENVIRONMENTAL IMPACT STUDY OF WESTERN COAL DEVELOPMENT.
PROJECT NUMBER:
10470040
PROJECT SUPERVISOR:
BENNY L. PARKER
OLD WEST REGIONAL COMMISSION
1730 K ST. N.W. SUITE 426
WASHINGTON, DC
202-967-3491
COOPERATOR/COORDINATOR:
THOMAS E. CARROLL ASSOCIATES
STEPHEN G. MILLER
1700 PENNSYLVANIA AVE. N.W., SUITE 630

WASHINGTON, DC 20006
PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
BENNY L. PARKER
1730 K ST. N.W., SUITE 426
WASHINGTON, DC 20006
202-967-3491
PRIMARY FUNDING AMOUNT:
60,000
TIME FRAME:
02 04 74 TO 09 04 74
STATUS:
COMPLETED 09 04 74
LOCATION:
MT WY ND SD
ABSTRACT:

BECAUSE OF THE GROWING DEMAND FOR COAL IN THE US AND THE ABUNDANCE OF STRIPMINEABLE COAL IN MONTANA, WYOMING AND THE DAKOTAS, THE CONTRACT'S PURPOSE WAS TO EXAMINE MORE DESIRABLE PROCESS ALTERNATIVES. SINCE LITTLE WAS KNOWN OF SUCH ALTERNATIVE PROCESSES, OTHER THAN THEIR TECHNOLOGICAL FEASIBILITY, CONTRACTOR EXAMINED THE IMPACT IN TERMS OF DIRECT ENVIRONMENTAL, LAND DISTURBANCE, WATER USE AND ASSOCIATED FACTORS, PLUS INDIRECT IMPACTS OF POPULATION GROWTH, ECONOMIC CONSEQUENCES AND 'QUALITY OF LIFE' CONSIDERATIONS.

REPORTS AND PUBLICATIONS:

THOMAS E. CARROLL ASSOCIATES, 'ENVIRONMENTAL IMPACTS OF ALTERNATIVE CONVERSION PROCESSES FOR WESTERN COAL DEVELOPMENT'. DATED: OCTOBER 25, 1974. OLD WEST REGIONAL COMMISSION, 1730 K ST. N.W., SUITE 426, WASH., DC.

00000008
PROJECT TITLE:
SIMULATION MODELING OF ENVIRONMENTAL AND SOCIAL IMPACTS OF COAL DEVELOPMENT IN THE POWDER RIVER BASIN
PROJECT SUPERVISOR:
RICHARD DOELL
U.S. GEOLOGICAL SURVEY
345 MIDDLEFIELD RD.
MENLO PARK, CALIF. 94025
415-323-8111
PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
TIME FRAME:
01 01 75 TO 10 01 76
LOCATION:
WY MT - POWDER RIVER BASIN
ABSTRACT:

THE PURPOSE OF THIS STUDY IS TO CREATE A SYSTEM DYNAMICS SIMULATION MODEL OF ENVIRONMENTAL AND SOCIAL IMPACTS OF COAL DEVELOPMENT IN THE POWDER RIVER BASIN. THE MODEL WILL BE COMPUTERIZED AND WILL MAKE USE OF SEVERAL DEVELOPMENT SCENARIOS - THOSE OF THE NORTHERN GREAT PLAINS RESOURCES PROGRAM, AS WELL AS OTHER INPUT SCENARIOS.

00000009
PROJECT TITLE:
COLOR INFRARED AERIAL PHOTOGRAPHY - MONTANA, NORTH DAKOTA, AND WYOMING - AREAS SUBJECT TO ENERGY DEVELOPMENT - JOINT BLM/USFWS VENTURE
PROJECT NUMBER:
1130-613-64
INVESTIGATORS:
FRED BATSON
BUREAU OF LAND MANAGEMENT
FED. BLDG.
BILLINGS, MT 59101
MARK HURD AERIAL SURVEYS, INC. (CONTRACTOR)
MINNEAPOLIS, MN
PROJECT SUPERVISOR:
JERALD STROEBELE
U.S. FISH AND WILDLIFE SERVICE
P. O. BOX 25486 - DENVER FED. CTR.
DENVER, CO 80225
303-234-5586
PRIMARY SPONSOR:
U.S. FISH AND WILDLIFE SERVICE
SECONDARY SPONSORS:
U.S. BUREAU OF LAND MANAGEMENT
PRIMARY FUNDING AMOUNT:
102,000 (USFWS)
SECONDARY FUNDING AMOUNTS:
16,000 (USBLM)
TIME FRAME:
05 25 75 TO 06 15 75
STATUS:
COMPLETED 10 15 75
LOCATION:
ND MT WY
ABSTRACT:

THE FISH AND WILDLIFE SERVICE AND THE BUREAU OF LAND MANAGEMENT ENTERED A COOPERATIVE AGREEMENT WHEREBY THE SERVICE PROVIDED THE BULK OF FUNDS AND THE BUREAU PROVIDED CONTRACTING SERVICES FOR ACQUISITION OF 27,000 SQUARE MILES OF 1:80,000 COLOR INFRARED PHOTOGRAPHY AND 970 LINEAL MILES OF 1:24,000 CIR PHOTOGRAPHY. IN MONTANA, ALL OF DAWSON, RICHLAND, AND WIBAUX COUNTIES, MOST OF MCCONE COUNTY, AND PART OF CARTER, CUSTER, ROOSEVELT AND SHERIDAN COUNTIES WERE PHOTOGRAPHED. IN NORTH DAKOTA, ALL OF BILLINGS, BOWMAN, BURLEIGH, DUNN, GOLDEN VALLEY, HETTINGER, MCLEAN, MERCER, MORTON, OLIVER, SLOPE, AND STARK COUNTIES, AND MUCH OF ADAMS COUNTY WERE PHOTOGRAPHED. ALL OF THE 1:80,000 PHOTOGRAPHY IS QUAD-CENTERED; EVERY OTHER FRAME

CORRESPONDS TO THE USGS 7 1/2 MINUTE QUAD MAPS. A DUPLICATE OF THIS PHOTOGRAPHY WILL BE STORED AT THE EROS DATA CENTER, SIOUX FALLS, SD - AND IS AVAILABLE TO THE PUBLIC FOR PURCHASE OF COPIES. THE 1:24,000 SCALE PHOTOGRAPHY COVERS THE MISSOURI RIVER BETWEEN GARRISON DAM AND OAHE RESERVOIR IN NORTH DAKOTA AND BETWEEN MARONY DAM AND FT. PECK DAM IN MONTANA. IT COVERS THE YELLOWSTONE RIVER FROM THE MOUTH OF THE BIGHORN RIVER TO ITS CONFLUENCE WITH THE MISSOURI. IT ALSO COVERS THE BIGHORN RIVER DOWNSTREAM FROM HARDIN, MT. THIS IS CONSIDERED PROJECT IMAGERY. FOR AVAILABILITY, GOVERNMENT AGENCIES CONTACT THE PRIMARY SPONSOR.

00000010

PROJECT TITLE:
COMPUTER ANALYSIS OF LANDSAT (ERTS-1) SCENE OF THE BIGHORN RIVER DOWNSTREAM FROM HARDIN, MT

PROJECT NUMBER:
1130-613-63

INVESTIGATORS:
D. LEE MILLER
CIVIL ENG. DEPT.
COLORADO STATE UNIV.
FT. COLLINS, CO

PROJECT SUPERVISOR:
JERALD STROEBELE
U.S. FISH AND WILDLIFE SERVICE
P.O. BOX 25486 - DENVER FED. CTR.
DENVER, CO
303-234-5586

PRIMARY SPONSOR:
U.S. FISH AND WILDLIFE SERVICE

PRIMARY FUNDING AMOUNT:
6,665

SECONDARY FUNDING AMOUNTS:
3,000 (INHOUSE)

TIME FRAME:
06 01 75 TO 11 30 75

LOCATION:
MT - BIGHORN, YELLOWSTONE, AND TREASURE COUNTIES

ABSTRACT:
THE FISH AND WILDLIFE SERVICE HAS CONTRACTED WITH CSU TO PERFORM A COMPUTER ANALYSIS OF PART OF A LANDSAT (ERTS-1) SCENE TO DETERMINE WHETHER VARIOUS RIPARIAN PLANT COMMUNITIES CAN BE READILY IDENTIFIED AND QUANTIFIED. SCENE NUMBER E17151721G000 OF 8-JULY-1974 IS BEING ANALYZED. GROUND TRUTH INPUTS CONSIST OF A COVERTYPE MAP PREPARED BY THE USFWS IN 1974 AND 1975 OF 1:24,000 SCALE COLOR INFRARED PHOTOGRAPHY. AS OF OCTOBER 1, 1975, THE 6 QUADS HAD BEEN ROTATED AND GEOMETRICALLY CORRECTED AND TRAINING SITE SELECTION COMPLETED. OUTPUT PRODUCT WILL BE AT THE SCALE OF 1:24,000. THE LOCATION OF THE STUDY IS OF THE FOLLOWING USGS 7 1/2 GRADE MAPS: BIGHORN, FOSTER, HARDIN, MARSH, COULEE, MISSION CREEK, AND 9-MILE POINT. COUNTIES IN MONTANA ARE BIGHORN, YELLOWSTONE, AND TREASURE COUNTIES.

```
000011
OJECT TITLE:
 NORTH DAKOTA RECLAMATION STUDY
OJECT NUMBER:
 10470016
VESTIGATORS:
 STEVEN MORAN
 ...NORTH DAKOTA GEOLOGICAL SURVEY  701-777-2011
 DR. ARMAND BAUER
 ...NORTH DAKOTA STATE UNIVERSITY
OJECT SUPERVISOR:
 NORTH DAKOTA PLANNING DIVISION
 DIRECTOR
 CAPITOL BLDG.
 BISMARCK, ND  58501
 701-224-2697
OPERATOR/COORDINATOR:
 NORTH DAKOTA PLANNING DIVISION
IMARY SPONSOR:
 OLD WEST REGIONAL COMMISSION
 WILLIAM FOGARTY
 PRATT BLDG.  306A
 BILLINGS, MT  59101
 406-245-6711 X6665
IMARY FUNDING AMOUNT:
 420,000
ME FRAME:
 06 20 74 TO 06 30 76
CATION:
 ND
STRACT:
 RECOMMENDATIONS ARE DEVELOPED FOR THE RECLAMATION PROCEDURES
 TO BE FOLLOWED IN MINED LAND AREAS.  THE CHEMICAL AND PHYSICAL
 CHARACTERISTICS OF SHAPED MINED LANDS AND THEIR EFFECT ON THE
 ESTABLISHMENT OF PLANTS IS DETERMINED AS WELL AS THE
 CHARACTERISTICS OF SURFACE AND ROOT ZONE HYDROLOGY OF SHAPED
 SPOIL MATERIALS.  THE INFLUENCE OF SUBSURFACE GEOLOGIC
 MATERIALS ON REHABILITATION POTENTIAL AND THE EFFECTS OF
  SURFACE MINING ON SHALLOW GROUND WATER SUPPLIES ARE EXPLORED.


000012
OJECT TITLE:
 THE POTENTIAL OF STRIP MINING FILLS AS UNDERGROUND AQUIFERS AND
 WATER STORAGE AREAS IN THE POWDER RIVER BASIN
 10470025
VESTIGATORS:
 DR. PERRY H. RAHN  605-394-2464
OJECT SUPERVISOR:
 FRED E. NUHMEL
 SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY
   ENGINEERING AND MINING EXPERIMENT STATION
   RAPID CITY, SD  57701
   605-394-2511
PRIMARY SPONSOR:
   OLD WEST REGIONAL COMMISSION
   WILLIAM FOGARTY
   PRATT BLDG.  306A
   BILLINGS, MT  59101
   406-245-6711 X6665
PRIMARY FUNDING AMOUNT:
   80,000
TIME FRAME:
   06 28 74 TO 06 30 76
LOCATION:
   WY  SD  MT
ABSTRACT:
   THE RESULTS OBTAINED FROM THIS PROJECT WILL BE GUIDELINES FOR
   DETERMINING POTENTIAL OF STRIPMINING FILLS AS UNDERGROUND
   AQUIFERS AND WATER STORAGE AREAS IN THE POWDER RIVER
   BASIN.  OTHER DATA TO BE OBTAINED FROM THIS PROJECT
   SHALL BE:
   A.  TO ESTABLISH THE POROSITY-PERMEABILITY OF SELECTED SPOILS.
   B.  TO ESTABLISH THE COMPOSITION OF SPOILS AND EFFECTS ON WATE
   COMPOSITION.
   C.  TO ESTABLISH THE COMPOSITION OF THE WATER IN SPOILS.
   D.  TO ESTABLISH GROUNDWATER RECHARGE, DISCHARGE AND FLOW
   DIRECTION.
   E.  TO ESTABLISH POTENTIAL AREAS WHERE RECHARGE OF THESE BACK-
   FILLED SPOILS ARE FEASIBLE.


000013
PROJECT TITLE:
   RECLAMATION OF WESTERN MINED-LAND AND SPOIL BANKS
INVESTIGATORS:
   W. W. FOWKES; M. K. WALI
RESEARCH FACILITY:
   U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
   GRAND FORKS ENERGY RESEARCH CENTER
   GRAND FORKS, ND  58201
PRIMARY SPONSOR:
   U.S. ENERGY RESEARCH DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
   1973 - 58,000
   1974 - 140,000
   1975 - 205,000
TIME FRAME:
   01 01 72 - CONTINUING
LOCATION:
   ND
ABSTRACT:
   EVALUATION OF STATUS OF ON-GOING RECLAMATION EFFORTS AT
   WESTERN COAL MINES, AND PROVIDING DATA TO ASSIST IN DEV-
```

ELOPMENT OF NEW RECLAMATION PROJECTS AND IMPROVING EXISTING PROGRAMS. DEVELOPMENT OF VIABLE PROCEDURES FOR RECLAIMING WESTERN STRIP MINE SPOIL.

REPORTS AND PUBLICATIONS:

M. K. WALI AND P. G. FREEMAN. 'ECOLOGY OF SOME MINED AREAS IN NORTH DAKOTA.' NORTH DAKOTA GEOLOGICAL SURVEY EDUCATION SERIES 5, 1974, PAGES 25-47.

00000014

PROJECT TITLE:

RECLAMATION AND MANAGEMENT OF STRIP-MINE SPOILS IN THE NORTHERN PLAINS

INVESTIGATORS:

F. M. SANDOVAL; J. J. BOND; J. F. POWER

RESEARCH FACILITY:

U.S. AG. RESEARCH SERVICE, NORTHERN GR. PLAINS RESEARCH CTR.
MANDAN, ND 58554

PRIMARY SPONSOR:

U.S. DEPT. OF AGRICULTURE, COOP STATE RESEARCH SERVICE

PRIMARY FUNDING AMOUNT:

1973 - 42,000
1974 - 142,000
1975 - 146,000

TIME FRAME:

11 13 73 TO 11 13 78

ABSTRACT:

THE OBJECTIVES ARE TO EVALUATE THE PHYSICAL,CHEMICAL, AND BIOLOGICAL PROPERTIES OF STRIP-MINE SPOILS, AND DEVELOP METHODS OF RESTORING PRODUCTIVITY TO SUCH DESPOILED AREAS. THE APPROACHES ARE THAT PHYSICAL, CHEMICAL, BIOLOGICAL, HYDROLOGICAL, AND GEOLOGICAL CHARACTERISTICS OF SPOIL MATERIALS ARE DETERMINED IN THE FIELD, LABORATORY, AND GROWTH CHAMBER. INFORMATION OBTAINED FORMS A BASIS FOR DEVISING ENGINEERING, CULTURAL, AND AGRONOMIC PRACTICES TO BE INVESTIGATED. FIELD PLOTS ARE ESTABLISHED TO EVALUATE THE EFFECTS OF SUCH FACTORS AS CHEMICAL AMENDMENTS AND FERTILIZERS, ORGANIC AND INORGANIC MULCHES, DIFFERENT GEOLOGIC AND SOIL MATERIALS, TILLAGE AND LAND FORMING, PLANT SPECIES AND CROPPING SEQUENCE, AND RELATED FACTORS ON THE RESTORATION OF PRODUCTIVITY TO DESPOILED AREAS. RESULTS PROVIDE A BASIS FOR RECLAMATION OF DESPOILED AREAS IN A SEMIARID CLIMATE.

REPORTS AND PUBLICATIONS:

1.J. F. POWER, J. J. BOND, ET AL. 'NITRIFICATION IN PALEOCENE SHALES.' SCIENCE 183: 1077-1079; 2.F. M. SANDOVAL, J. J. BOND, ET AL. 'LIGNITE MINE SPOILS IN THE NORTHERN GREAT PLAINS--CHARACTERISTICS AND POTENTIAL FOR RECLAMATION.' RES. AND APPLIED TECHNOLOGY. SYMPOSIUM ON MINED-LAND RECLAMATION. PITTSBURGH, PA., P. 117-133; 3.F. M. SANDOVAL, J. J. BOND, ET AL. 'LIGNITE MINE SPOILS IN THE NORTHERN GREAT PLAINS--CHARACTERISTICS AND POTENTIAL FOR RECLAMATION.' N. DAK. GEOL. SURV. ED. SERIES 5. PP. 1-24.

00000015

PROJECT TITLE:

SELECTION OF SUITABLE PLANT MATERIALS AND DEVELOPMENT OF PLANT ESTABLISHMENT TECHNIQUES. (RECLAMATION)

INVESTIGATORS:

R. S. MACLAUGHLAN

RESEARCH FACILITY:

U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE
WASHINGTON, D. C. 20250

PRIMARY SPONSOR:

U.S. DEPT. OF AGRICULTURE, SOIL CONSERVATION SERVICE

PRIMARY FUNDING AMOUNT:

1973 - 200,000
1974 - 230,000
1975 - 360,000

TIME FRAME:

01 01 73 TO INDEFINITE

LOCATION:

AZ ID KY MD MI MO MT NY OR TX WA

ABSTRACT:

DEVELOP PLANTS BEST SUITED FOR MINE LAND RECLAMATION UNDER A WIDE RANGE OF SITE CONDITIONS. EVALUATIONS ARE MADE IN TERMS OF PLANT SURVIVAL AND GROWTH, EROSION CONTROL, AND SUITABILITY FOR OTHER USES. TECHNIQUES ARE DEVELOPED FOR THE INCREASE (PRODUCTION OF SEED OF STOCK) OF SELECTED PLANTS FOR MINED LAND RECLAMATION. TECHNIQUES, INCLUDING THE MODIFICATION OF EQUIPMENT, FOR THE SUCCESSFUL ESTABLISHMENT AND LONG-TERM SURVIVAL OF VEGETATION ON DISTURBED SOILS ARE ALSO DEVELOPED. SELECTED MATERIALS ARE MADE AVAILABLE FOR COMMERCIAL INCREASE AND AVAILABILITY FOR MINE LAND RECLAMATION.

REPORTS AND PUBLICATIONS:

1. 'GUIDE FOR CLASSIFYING AND REVEGETATING STRIP MINE AND OTHER SPOIL AREAS IN OHIO.' SOIL CONSERVATION SERVICE, USDA, COLUMBUS, OH., JAN 1969; 2.'A GUIDE FOR REVEGETATING BITUMINOUS STRIP-MINE SPOILS IN PENNSYLVANIA.' RESEARCH COMMITTEE ON COAL MINE SPOIL REVEGETATION IN PENNSYLVANIA. PUBLISHED 1965, REVISED 1971; 3. 'KENTUCKY GUIDE FOR CLASSIFICATION, USE AND VEGETATIVE TREATMENT OF SURFACE MINE SPOILS.' USDA SOIL CONSERVATION SERVICE, LEXINGTON, KY., REV. 1973

00000016

PROJECT TITLE:

RECLAMATION OF SPOILS RESULTING FROM SURFACE MINING OF LIGNITE

INVESTIGATORS:

U.S. DEPT. OF AGRICULTURE, AGRICULTURAL RESEARCH SERVICE

RESEARCH FACILITY:

U.S. DEPT. OF AGRICULTURE

AGRICULTURAL ENGINEERING RESEARCH DIVISION
NORTHERN GREAT PLAINS RESEARCH CENTER
MANDAN, ND 58554

PRIMARY SPONSOR:
J. J. BOND

PRIMARY FUNDING AMOUNT:
1972 - 34,000
1973 - 50,000
1974 - 50,000

TIME FRAME:
01 01 68 - CONTINUING

LOCATION:
ND

ABSTRACT:

OVERBURDEN MATERIALS LEFT AS SPOILS ON THE SURFACE AFTER SURFACE MINING FOR LIGNITE IN NORTH DAKOTA IS BEING STUDIED IN THE LABORATORY AND IN THE FIELD TO EVALUATE THEIR POTENTIAL FOR RECLAMATION AND REVEGETATION. RESULTS THUS FAR SHOW THAT PHYSIO-CHEMICAL PROPERTIES OF MATERIALS PRESENTLY LEFT AS SPOILS PROVIDE A VERY POOR ENVIRONMENT FOR VEGETATIVE GROWTH. SPOIL MATERIALS ARE OFTEN EXTREMELY FINE-TEXTURED, MODERATELY SALINE, AND HIGHLY SODIC. THESE MATERIALS ARE ALSO VERY LOW IN ORGANIC MATTER, WHICH COMBINED WITH FINE TEXTURE, ENHANCES THE SODIUM DISPERSION EFFECT AND RENDERS THE SPOIL MATERIALS EXTREMELY UNSTABLE, HIGHLY IMPERMEABLE AND ERODIBLE TO WATER. TREATMENTS INCLUDE EFFORTS AT SOIL AMENDMENT, IMPROVING FERTILIZATION, REPLACEMENT OF TOPSOIL, VEGETATIVE MULCHES, AND FIELD TEST PLOTS SEEDED TO VARIOUS SPECIES OF NATIVE GRASSES TO DETERMINE BENEFITS AND/OR EFFECTS OF VARIOUS SOIL AMENDMENTS, APPLICATION OF CHEMICAL FERTILIZERS, REPLACEMENT OF SURFACE SOIL MATERIALS AND OTHER PRACTICES.

REPORTS AND PUBLICATIONS:

(1)NORTHERN PLAINS BRANCH, SOIL AND WATER CONSERVATION RESEARCH DIVISION, AGRICULTURAL RESEARCH SERVICE, USDA, NORTHERN GREAT PLAINS RESEARCH CENTER, SWC RESEARCH REPORT NO. 427, 'PROGRESS REPORT ON REVEGETATION STUDIES ON COAL MINE SPOILS OF NORTH DAKOTA.' MANDAN, ND (NOVEMBER,1973); (2)F. M. SANDOVAL, J. J. BOND, ET AL. 'LIGNITE MINE SPOILS IN NORTHERN GREAT PLAINS--CHARACTERISTICS AND POTENTIAL FOR RECLAMATION.' SOIL SCIENTISTS FROM THE NORTHERN GREAT PLAINS RESEARCH CENTER, SOIL, WATER AND AIR SCIENCES, NORTH CENTRAL REGION AGRICULTURAL RESEARCH SERVICE, USDA, MARCH 1973, MANDAN, ND 58554

00000017

ROJECT TITLE:
SPECIES RESPONSE TO SALT LEVELS AND SOIL TEXTURE

ROJECT NUMBER:
M-74-10

NVESTIGATORS:
R. E. RIES; F. M. SANDOVAL; W. O. WILLIS

PROJECT SUPERVISOR:
J. F. POWER
NORTHERN GREAT PLAINS RESEARCH CENTER
BOX 459
MANDAN, ND 58554

COOPERATOR/COORDINATOR:
PEABODY COAL CO. (COLSTRIP)

PRIMARY SPONSOR:
U.S. AG. RESEARCH SERVICE
SURFACE ENVIRONMENT AND MINING

PRIMARY FUNDING AMOUNT:
25,000 ANNUALLY

TIME FRAME:
01 01 75 TO 12 30 76

LOCATION:
ND

ABSTRACT:

PROBLEM: FORT UNION SEDIMENTS VARY CONSIDERABLY IN CONTENT OF BOTH SODIUM AND MAGNESIUM SULFATE. ALTHOUGH THIS VARIATION IS ROUTINELY MONITORED BY ELECTRICAL CONDUCTIVITY MEASUREMENT, SPECIFIC EFFECTS OF VARIATIONS IN CONCENTRATION OF THESE IONS, PARTICULARLY AS AFFECTED BY SOIL TEXTURE, IS LARGELY UNKNOWN.

OBJECTIVES: TO EVALUATE THE RESPONSE OF EIGHT PERENNIAL SPECIES GROWN IN MEDIUM AND FINE-TEXTURED SPOILS TO FOUR LEVELS OF NA AND MG SALTS.

METHODS: SODIUM AND MAGNESIUM SULFATE ALONE AND TOGETHER, WERE ADDED TO SPOILS OF TWO TEXTURES IN SUFFICIENT QUANTITY TO RAISE ELECTRICAL CONDUCTIVITY TO ABOUT 10 MMHOS/CM. SEED FROM EIGHT PERENNIAL SPECIES WERE THEN 1) GERMINATED IN PETRI DISHES CONTAINING THESE SOLUTIONS; 2) GROWN FROM SEED FOR AT LEAST 3 WEEKS AFTER EMERGENCE IN SPOILS RECEIVING THESE SALT TREATMENTS; AND 3) GROWN FROM TRANSPLANTS TO MATURITY IN A GROWTH CHAMBER IN SPOILS TREATED WITH THESE SALTS. DATA ON PLANT SURVIVAL AND GROWTH WERE COLLECTED IN ALL EXPERIMENTS. DATA FROM 1) PROVIDE INFORMATION ON THE GERMINATION PROCESS; FROM 2)ON SEEDLING ESTABLISHMENT; AND FROM 3) ON PLANT GROWTH AND SURVIVAL.

STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE, REGRESSION ANALYSIS

REPORTS AND PUBLICATIONS:

PROGRESS REPORT ON RESEARCH ON RECLAMATION OF MINED LANDS IN THE NORTHERN GREAT PLAINS. U.S. AG, RESEARCH SERVICE (NORTHERN GREAT PLAINS RESEARCH CENTER) AND NORTH DAKOTA AG. EXP. STATION, SOILS DEPT. 1975.

00000018

PROJECT TITLE:
DEVELOPMENT OF PERENNIAL GRASS SPECIES
ADAPTED FOR USE IN STRIP-MINE RECLAMATION.
COMMODITY COAL

PROJECT NUMBER:
M-73-?
INVESTIGATORS:
J. J. BOND
PROJECT SUPERVISOR:
R. E. BARKER
NORTHERN GREAT PLAINS RESEARCH CENTER
P. O. BOX 459
MANDAN, ND 58554
COOPERATOR/COORDINATOR:
CONSOLIDATION COAL CO.
PRIMARY SPONSOR:
U.S. AG. RESEARCH SERVICE, NORTHERN GREAT PLAINS RESEARCH CTR.
PRIMARY FUNDING AMOUNT:
1973 AND 1974 - 20,000 ; 10,000 THEREAFTER
TIME FRAME:
01 01 73 TO INDEFINITE
LOCATION:
ND
ABSTRACT:

PROBLEM: LITTLE IS KNOWN HOW GRASS SPECIES NORMALLY ADAPTED TO AGRICULTURAL SOILS WILL PERFORM ON SPOILS, OR IF DEVELOPMENT OF NEW CULTIVARS IS REQUIRED.

OBJECTIVES: TO SCREEN EXISTING GRASS SPECIES FOR ADAPTABILITY TO USE ON SPOILS AND TO DEVELOP NEW CULTIVARS AS NEEDED.

METHOD: APPROXIMATELY 36 SPECIES OR CULTIVARS OF GRASS SPECIES WERE PLANTED IN REPLICATED PLOTS ON SODIC SPOILS WITH AND WITHOUT ONE FOOT OF TOPSOIL RETURNED. GROWTH, SURVIVAL, AND PRODUCTIVITY WILL BE EVALUATED AND RESULTS WILL DICTATE NEED FOR DEVELOPMENT OF NEW CULTIVARS THROUGH BREEDING OR SELECTION.

STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE.

SUMMARY: PLOTS WERE SEEDED IN SPRING 1974.

00000019
PROJECT TITLE:
RECLAMATION ON SPOIL BANKS FROM STRIP MINING OF LIGNITE AND WESTERN COAL - MANAGING COAL WASTES AND POLLUTANTS
PROJECT E-5
INVESTIGATORS:
W. G. FOWKES; P. G. FREEMAN
RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
GRAND FORKS ENERGY RESEARCH LAB
BOX 8213, UNIVERSITY STATION
GRAND FORKS, ND 58201
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
PROPRIETARY
TIME FRAME:
07 01 72 TO INDEFINITE
LOCATION:
ND
ABSTRACT:

THE PURPOSE OF THIS PROJECT IS TO DEVELOP TECHNIQUES FOR IMPROVING RECLAMATION ON SPOIL BANKS FROM STRIP MINING OF LIGNITE AND WESTERN COALS. THE BUREAU WILL COOPERATE WITH MINING COMPANIES AND ELECTRIC UTILITIES IN THE STUDY OF TECHNIQUES TO IMPROVE REGENERATION OF SPOIL BANKS. SOIL STUDIES OF SPOILS FROM VARIOUS LOCATIONS WILL BE CONDUCTED IN COOPERATION WITH THE BIOLOGY DEPARTMENT OF THE UNIVERSITY OF NORTH DAKOTA. BY PERSONAL INTERVIEW OR CORRESPONDENCE, INFORMATION WILL BE COLLECTED, RELATIVE TO PREVIOUS OR ONGOING ATTEMPTS AT RECLAMATION OF GREAT NORTHERN PLAINS MINE SPOILS.

00000020
PROJECT TITLE:
RECLAMATION OF STRIP-MINE SPOILS RELATED TO GYPSUM AND TOPSOIL ADDITIONS AT MAJOR MINING SITES IN WESTERN NORTH DAKOTA.
COMMODITY: LIGNITE
PROJECT NUMBER:
M-73-6
INVESTIGATORS:
F. M. SANDOVAL; J. F. POWER; W. O. WILLIS
PROJECT SUPERVISOR:
J. J. BOND
NORTHERN GREAT PLAINS RESEARCH CENTER
P. O. BOX 459
MANDAN, ND 58544
COOPERATOR/COORDINATOR:
MAJOR MINING COMPANIES IN WESTERN NORTH DAKOTA
PRIMARY SPONSOR:
U.S. AG. RESEARCH SERVICE, NORTHERN GREAT PLAINS RESEARCH CTR.
PRIMARY FUNDING AMOUNT:
1973 - 30,000 ; 20,000 THEREAFTER
TIME FRAME:
01 01 73 TO INDEFINITE
LOCATION:
ND
ABSTRACT:

PROBLEM: ON HIGHLY SODIC SPOILS EARLIER WORK INDICATED GYPSUM, TOPSOIL AND FALLOW MAY HAVE SOME BENEFITS FOR RECLAMATION, BUT NO INFORMATION WAS AVAILABLE FROM OTHER TYPES OF SPOILS.

OBJECTIVE: TO EVALUATE THE EFFECTS OF GYPSUM, TOPSOIL, AND FALLOW, ALONE AND IN COMBINATION, ON PLANT GROWTH POTENTIAL OF SPOILS VARYING IN SODIUM CONTENT, TEXTURE, AND OTHER PROPERTIES.

METHODS: REPLICATED FIELD EXPERIMENTS WERE ESTABLISHED AT FOUR MINE SITES IN NORTH DAKOTA WITH TREATMENTS (IN FACTORIAL COMBINATION) WITH AND WITHOUT GYPSUM, TOPSOIL,

AND 2 YEARS OF FALLOW. PLOTS WERE SEEDED TO GRASS IN SPRING OF 1974.
STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE.

00000021
PROJECT TITLE:
EROSIONAL AND RUNOFF OF SPOIL BANKS ON RESHAPED TOPOGRAPHY.
COMMODITY: COAL
PROJECT NUMBER:
RM-1651-04
PROJECT SUPERVISOR:
EARL F. ALDON
ROCKY MTN. FOREST & RANGE EXP. STATION
240 WEST PROSPECT STREET
FORT COLLINS, CO 80521
COOPERATOR/COORDINATOR:
UTAH INTERNATIONAL, INC.
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 x6468
PRIMARY FUNDING AMOUNT:
13000
TIME FRAME:
09 30 74 TO 12 30 80
LOCATION:
NM
ABSTRACT:
PROBLEM: DETERMINE ERODIBILITY OF SPOIL MATERIALS AND DEVELOP EROSION CONTROL TECHNIQUES.
OBJECTIVES: DETERMINE SURFACE RUNOFF, EROSION, AND SOIL MOISTURE ACCRETION UNDER NATURAL PRECIPITATION ON RESHAPED SPOIL BANKS.
METHODS: SET UP EROSION AND RUNOFF PLOTS.
STATISTICAL ANALYSIS: ANOVA.
REPORTS AND PUBLICATIONS:
WORK PLAN: JUNE 30, 1974
REPORTS: STUDY PLAN, ESTABLISHMENT REPORT, PUBLISHED ARTICLE.

00000022
PROJECT TITLE:
CLASSIFICATION OF SPOILS.
COMMODITY: COAL
PROJECT NUMBER:
M-1651 SC
INVESTIGATORS:
DR. RONALD J. ROMAN
NEW MEXICO BUREAU OF MINES & MINERAL RESOURCES
NEW MEXICO INSTITUTE OF MINING & TECHNOLOGY
SOCORRO, NM 87801
PROJECT SUPERVISOR:
EARL F. ALDON
ROCKY MTN. FOREST & RANGE EXP. STATION
240 WEST PROSPECT STREET
FORT COLLINS, CO 80521
COOPERATOR/COORDINATOR:
UTAH INTERNATIONAL, INC.
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 x6468
PRIMARY FUNDING AMOUNT:
12000
TIME FRAME:
12 30 74 TO 06 30 75
LOCATION:
NM
ABSTRACT:
PROBLEM: DETERMINE PHYSICAL, CHEMICAL AND HYDROLOGICAL CHARACTERISTICS OF OVERBURDEN STRATA BEFORE MINING.
OBJECTIVES: DEVELOP A SIMULATION PACKAGE TO GIVE SPACIAL DISTRIBUTION OF THE VARIOUS STRATA IN SPOIL BANKS.
METHODS: PREPARE A SURFACE MAP OF CLASSIFIED SPOIL MATERIAL.
STATISTICAL ANALYSIS: N.A.
REPORTS AND PUBLICATIONS:
WORK PLAN: JULY 30, 1974
REPORTS: STUDY PLAN, MODEL PRINTOUT, FINAL REPORT.

00000023
PROJECT TITLE:
COMPOSITION AND RATE OF NATURAL VEGETATION OF DEVASTATED AREAS.
COMMODITY: COAL
PROJECT NUMBER:
RM-1651 S CO A
INVESTIGATORS:
DR. W. MARTIN
UNIVERSITY OF NEW MEXICO
UNIVERSITY HILL NE
ALBUQUERQUE, NM 87106
PROJECT SUPERVISOR:
H. [illegible] SPRINGFIELD
ROCKY MTN. FOREST & RANGE EXP. STATION
240 WEST PROSPECT STREET
FORT COLLINS, CO 80521
COOPERATOR/COORDINATOR:
PITTSBURG-MIDWAY COAL CO.

PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
5000
TIME FRAME:
10 30 74 TO 06 30 75
LOCATION:
NM
ABSTRACT:
PROBLEM: DETERMINE EFFECTS OF WEATHERING AND LEACHING ON SPOIL MATERIAL AND ITS EFFECT ON PLANT ESTABLISHMENT.
OBJECTIVES: DETERMINE FLORISTIC COMPOSITION OF DIFFERENT AGED SPOILS.
METHODS: BELT TRANSECT SAMPLING.
STATISTICAL ANALYSIS: ANOVA.
REPORTS AND PUBLICATIONS:
WORK PLAN: JUNE 30, 1974
REPORTS: STUDY PLAN, FINAL REPORT, PUBLISHED ARTICLE.

00000024
PROJECT TITLE:
GERMINATION AND MOISTURE REQUIREMENTS OF ARID LAND PLANTS.
COMMODITY: GENERAL APPLICABILITY
PROJECT NUMBER:
RM-1651 S CO A
INVESTIGATORS:
DR. GORDON JOHNSON
UNIVERSITY OF NEW MEXICO
UNIVERSITY HILL NE
ALBUQUERQUE, NM 87106
DR. W. MARTIN
UNIVERSITY OF NEW MEXICO
UNIVERSITY HILL NE
ALBUQUERQUE, NM 87106
PROJECT SUPERVISOR:
H. W. SPRINGFIELD
ROCKY MTN. FOREST & RANGE EXP. STATION
240 WEST PROSPECT STREET
FORT COLLINS, CO 80521
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
20000
TIME FRAME:
07 30 74 TO 06 30 77
LOCATION:
NM
ABSTRACT:
PROBLEM: QUANTIFY MACRO AND MICROENVIRONMENTAL FACTORS LIMITING REHABILITATION ON MINE SPOILS BY NATIVE SPECIES.
OBJECTIVES: DETERMINE OPTIMUM LIGHT, MOISTURE AND TEMPERATURE FOR 23 NATIVE SPECIES OF GRASSES AND SHRUBS FOR USE ON MINE SPOILS.
METHODS: USE THERMAL-GRADIENT PLATE.
STATISTICAL ANALYSIS: ANOVA.
REPORTS AND PUBLICATIONS:
WORK PLAN: JUNE 30, 1974
REPORTS: STUDY PLAN, FINAL REPORT, PUBLISHED ARTICLE.

00000025
PROJECT TITLE:
ESTABLISHMENT OF FOURWING SALTBUSH AND ALKALI SACATON ON NAVAJO MINE SPOILS.
COMMODITY: COAL
PROJECT NUMBER:
RM-1651-03
PROJECT SUPERVISOR:
EARL F. ALDON
ROCKY MTN. FOREST & RANGE EXP. STATION
240 WEST PROSPECT STREET
FORT COLLINS, CO 80521
MULCHES
COOPERATOR/COORDINATOR:
UTAH INTERNATIONAL, INC.
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
36000
TIME FRAME:
11 30 73 TO 12 30 75
LOCATION:
NM
ABSTRACT:
PROBLEM: DETERMINE EFFECTS OF PLASTIC PARAFFIN MULCHES ON ESTABLISHMENT OF NATIVE SHRUBS.
OBJECTIVES: DETERMINE IF FOURWING SALTBUSH AND ALKALI SACATON CAN BE ESTABLISHED AND MAINTAINED ON MINE SPOILS BY MEANS OF ARTIFICIAL FLOODWAYS.
METHODS: SET UP FIELD PLOTS AT NAVAJO MINE ON STEEP AND GENTLE SLOPE MINE SPOILS.
STATISTICAL ANALYSIS: ANOVA OF FACTORIAL EXPERIMENTS.
REPORTS AND PUBLICATIONS:
WORK PLAN: APRIL 6, 1973

```
    REPORTS:  STUDY PLAN, PUBLISHED ARTICLE.

00000026
PROJECT TITLE:
      REVEGETATION WITH DISTICHLIS STRICTA ON
      AREAS DISTURBED BY MINING.
   COMMODITY:  COAL
PROJECT NUMBER:
   RM-1651 S CO A
INVESTIGATORS:
   DR. G. JOHNSON
   UNIVERSITY OF NEW MEXICO
   UNIVERSITY HILL NE
   ALBUQUERQUE, NM  87106
   DR. W. MARTIN
   UNIVERSITY OF NEW MEXICO
   UNIVERSITY HILL NE
   ALBUQUERQUE, NM  87106
PROJECT SUPERVISOR:
   H. W. SPRINGFIELD
   ROCKY MTN. FOREST & RANGE EXP. STATION
   240 WEST PROSPECT STREET
   FORT COLLINS, CO  80521
COOPERATOR/COORDINATOR:
   UTAH INTERNATIONAL, INC.
   PITTSBURG-MIDWAY COAL CO.
PRIMARY SPONSOR:
   SURFACE ENVIRONMENT AND MINING
   145 GRAND AVE.
   BILLINGS, MT  59102
   406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
   10000
TIME FRAME:
   07 30 74 TO 06 30 76
LOCATION:
   NM
ABSTRACT:
    PROBLEM:  DETERMINE GROWTH OF NATIVE SPECIES ON SPOIL
      AREAS.
    OBJECTIVES:  DETERMINE WAY OF VEGETATIVE PROPOGATION OF
      DISTICHLIS STRICTA.
    METHODS:  FIELD, GREENHOUSE, AND GROWTH CHAMBER STUDIES.
    STATISTICAL ANALYSIS:  ANOVA.
REPORTS AND PUBLICATIONS:
   WORK PLAN:  JUNE 30, 1974
    REPORTS:  STUDY PLAN, ESTABLISHMENT REPORT, AND FINAL
      REPORT.

00000027
PROJECT TITLE:
     ENDOMYCORRHIZAL ASSOCIATION ON IMPORTANT
     SHRUBS.
PROJECT NUMBER:
   RM-1651-16-415-CA  S CO A
INVESTIGATORS:
   DR. D. LINDSEY
   NEW MEXICO STATE UNIVERSITY
   LAS CRUCES, NM  88001
PROJECT SUPERVISOR:
   EARL F. ALDON
   ROCKY MOUNTAIN STATION
   240 WEST PROSPECT STREET
   FORT COLLINS, CO  80521
COOPERATOR/COORDINATOR:
   UTAH INTERNATIONAL, INC.
   PITTSBURG-MIDWAY COAL CO.
   KAISER STEEL CO.
PRIMARY SPONSOR:
   SURFACE ENVIRONMENT AND MINING
   145 GRAND AVE.
   BILLINGS, MT  59102
   406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
   30000
TIME FRAME:
   10 30 74 TO 06 30 76
LOCATION:
   NM
ABSTRACT:
     PROBLEM:  DETERMINE EFFECT OF MYCORRHIZAE ON GROWTH OF
       FOURWING SALTBUSH.
     OBJECTIVES:  DESCRIBE, CLASSIFY, ISOLATE SPORES AND
       ESTABLISH CULTURES FOR INOCULATING MYCORRHIZAE ON
       FOURWING SALTBUSH AND OTHER NATIVE SHRUBS.
     METHODS:  POT CULTURES, LABORATORY, GREENHOUSE AND FIELD
       STUDIES.
     STATISTICAL ANALYSIS:  ANOVA.
REPORTS AND PUBLICATIONS:
   WORK PLAN:  JUNE 30, 1974
    REPORTS:  STUDY PLAN, FINAL REPORT, PUBLISHED REPORT.

00000028
PROJECT TITLE:
   SPECIES ADAPTABILITY TRIALS ON MINE SPOILS IN NEW MEXICO
   COMMODITY:  COAL
PROJECT NUMBER:
   RM-1651-08
INVESTIGATORS:
   H. WAYNE SPRINGFIELD
```

PROJECT SUPERVISOR:
EARL F. ALDON
ROCKY MOUNTAIN FOREST & RANGE EXP. STATION
240 W. PROSPECT ST.
FORT COLLINS, CO 80521
COOPERATOR/COORDINATOR:
PITTSBURG AND MIDWAY COAL MINING COMPANY
UTAH INTERNATIONAL, INC.
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
SECONDARY SPONSORS:
ROCKY MOUNTAIN FOREST & RANGE EXP. STATION
PRIMARY FUNDING AMOUNT:
10,000
TIME FRAME:
06 30 74 TO 12 30 80
LOCATION:
NM
ABSTRACT:
PROBLEM: DEVELOP ALTERNATIVE METHODS TO MINIMIZE ADVERSE IMPACTS OF MINING OF THE NATURAL ENVIRONMENT.
OBJECTIVES: DEVELOP AND TEST SPECIES ADAPTABILITY ON MINE SPOIL MATERIAL.
METHODS: SET OUT NATIVE AND INTRODUCED SPECIES ON MINE SITES.
STATISTICAL ANALYSIS: ANOVA
REPORTS AND PUBLICATIONS:
ESTABLISHMENT REPORT, NOV. 1, 1974. PUBLISHED ARTICLE.

00000029
PROJECT TITLE:
HARVESTING WATER FOR GROWING PLANTS ON MCKINLEY MINE SPOILS
COMMODITY: COAL
PROJECT NUMBER:
RM-1651-C6
INVESTIGATORS:
H. WAYNE SPRINGFIELD; DAVID G. SCHOLL
PROJECT SUPERVISOR:
EARL F. ALDON
ROCKY MTN. FOREST & RANGE EXP. STATION
240 W. PROSPECT ST.
FORT COLLINS, CO 80521
COOPERATOR/COORDINATOR:
PITTSBURG AND MIDWAY COAL MINING CO.
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
SECONDARY SPONSORS:
ROCKY MTN. FOREST & RANGE EXP. STATION
PRIMARY FUNDING AMOUNT:
15,000
TIME FRAME:
06 30 74 TO 12 30 80
LOCATION:
NM
ABSTRACT:
PROBLEM: DEVELOP ALTERNATIVE METHODS TO MINIMIZE ADVERSE IMPACTS OF MINING ON NATURAL ENVIRONMENT.
OBJECTIVES: DEVELOP SPECIAL EQUIPMENT AND TECHNIQUES TO ESTABLISH PLANTS ON MINED LANDS.
METHODS: SET UP TWO SIZES AND TWO METHODS OF TREATING SPOILS TO MEASURE RUNOFF EFFECTIVENESS ON PLANTS.
STATISTICAL ANALYSIS; ANOVA
REPORTS AND PUBLICATIONS:
ESTABLISHMENT REPORT, OCT. 22, 1974. PUBLISHED ARTICLE.

00000030
PROJECT TITLE:
HARVESTING WATER FOR GROWING NATIVE PERENNIAL PLANTS AT THE NAVAJO MINE
COMMODITY: COAL
PROJECT NUMBER:
RM-1651-C7
INVESTIGATORS:
H. WAYNE SPRINGFIELD
PROJECT SUPERVISOR:
EARL F. ALDON
ROCKY MTN. FOREST & RANGE EXP. STATION
240 W. PROSPECT ST.
FORT COLLINGS, CO 80521
COOPERATOR/COORDINATOR:
UTAH INTERNATIONAL, INC.; NAVAJO MINE
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
SECONDARY SPONSORS:
ROCKY MTN. FOREST & RANGE EXP. STATION
PRIMARY FUNDING AMOUNT:
20,000
TIME FRAME:
06 30 74 TO 12 30 80
LOCATION:
NM
ABSTRACT:
PROBLEM: DEVELOP ALTERNATIVE METHODS TO MINIMIZE ADVERSE IMPACTS OF MINING ON THE NATURAL ENVIRONMENT.
OBJECTIVES: DEVELOP SPECIAL EQUIPMENT AND TECHNIQUES TO

ESTABLISH PLANTS ON MINED LANDS.
METHODS: SET UP TWO SIZES OF PLOTS TO MEASURE RUNOFF AND PLANT GROWTH.
STATISTICAL ANALYSIS: ANOVA
REPORTS AND PUBLICATIONS:
ESTABLISHMENT REPORT, OCT. 4, 1974. FINAL REPORT.
PUBLISHED ARTICLE.

00000031
PROJECT TITLE:
SELECTION AND INCREASE OF WOODY PLANTS FOR MINE SPOILS IN THE NORTHERN GREAT PLAINS.
COMMODITY: COAL
PROJECT NUMBER:
16-417-CA
INVESTIGATORS:
DR. WARREN C. WHITMAN
BOTANY DEPARTMENT
NORTH DAKOTA STATE UNIVERSITY
FARGO, ND 58102
PROJECT SUPERVISOR:
ARDELL J. BJUGSTAD
RM-1711
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY
RAPID CITY, SD 57701
COOPERATOR/COORDINATOR:
NORTH AMERICAN COAL COMPANY
BAUKAL-NOONAN MINING CO.
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
9750
TIME FRAME:
09 01 74 TO 05 01 76
LOCATION:
ND
ABSTRACT:

PROBLEM: RESTORATION OF STRIP-MINED LANDS FREQUENTLY DEMANDS WOODY VEGETATION FOR ENHANCING WILDLIFE HABITAT, CONTROLLING EROSION, INCREASING RECREATION OPPORTUNITIES OR BECAUSE NOTHING ELSE CAN BECOME ESTABLISHED. EXOTIC AND COMMONLY ABUNDANT SPECIES ARE AVAILABLE BUT OFTEN FAILURES IN ESTABLISHMENT. MANY NATIVE WOODY PLANTS ARE SPARINGLY AVAILABLE AND NEED EVALUATION AS TO USEFULNESS.

OBJECTIVES: SPECIFIC OBJECTIVES ARE TO: (1) COLLECT AND TEST A NUMBER OF PROMISING NATIVE SHRUB SPECIES FOR USE IN MINE SPOIL REHABILITATION WORK, (2) ESTABLISH WOODY PLANT PRODUCTION PLOTS, (3) EVALUATE THE ADAPTION OF CERTAIN WOODY PLANT SPECIES TO EXISTING MINE SPOILS, (4) COLLECT AND EVALUATE THE SEEDS OF SPECIFIC WOODY SPECIES FOR GERMINABILITY, VIABILITY AND NEED OF PRE-PLANTING TREATMENTS, AND (5) EVALUATE SEEDLING ESTABLISHMENT, VIGOR AND GROWTH.

METHODS: SEVERAL PROMISING SPECIES OF WOODY PLANTS WILL BE SELECTED AND TRANSPLANTED TO PLOTS SITUATED ON COAL MINE SPOILS. THE ESTABLISHMENT AN PRODUCTIVITY WILL BE EVALUATED FOR A TWO-YEAR PERIOD. SEEDS OF THE SAME SPECIES WILL BE COLLECTED, EVALUATED FOR GERMINABILITY, VIABILITY AND NEED OF PRE-PLANTING TREATMENTS. THE SEEDS WILL ALSO BE PLANTED IN MINE SPOIL AND THE SEEDLINGS WILL BE EVALUATED AS TO ESTABLISHMENT, VIGOR AND GROWTH.

STATISTICAL ANALYSIS: FIELD PLOT AND GREENHOUSE EXPERIMENTAL DESIGN REMAINS TO BE PERFECTED IN DETAIL.

REPORTS AND PUBLICATIONS:
WORK PLAN: JUNE 25, 1974

REPORTS:		
	ESTABLISHMENT:	DECEMBER 1974
	INTERIM:	ANNUAL - MAY 1975
	FINAL:	MAY 1976

00000032
PROJECT TITLE:
SMALL BIRDS THAT READILY USE PRIMITIVE HABITATS ASSOCIATED WITH SURFACE MINING.
COMMODITY: COAL
PROJECT NUMBER:
RM-1711-18
PROJECT SUPERVISOR:
ARDELL J. BJUGSTAD
RM-1711
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY
RAPID CITY, SD 57701
COOPERATOR/COORDINATOR:
AMAX COAL CO.
AMERICAN COLLOID CO.
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
10000
TIME FRAME:
0[illegible] 01 75 TO [illegible] 01 80
LOCATION:
WY
ABSTRACT:

PROBLEM: SURFACE MINING COMPLETELY CHANGES THE

ENVIRONMENT OF THE MINE AREA LEAVING A SITUATION OFTEN UNACCEPTABLE TO PREMINING INHABITANTS. SOME SITUATIONS APPEAR TO BE MORE ACCEPTABLE TO SMALL BIRD SPECIES BUT ARE THESE THE SAME SPECIES THAT PREVIOUSLY OCCUPIED THE AREA OR ARE THERE CERTAIN SPECIES THAT READILY INVADE THE PRIMITIVE HABITATS CREATED BY SURFACE MINING?

OBJECTIVES: OBJECTIVES HERE ARE (1) TO DETERMINE WHICH SPECIES OF BIRDS ARE THE FIRST TO UTILIZE MINE SPOIL AREAS AND (2) TO QUANTIFY SUCH USE AS RELATED TO THE AGE AND TYPE OF REHABILITATION TECHNIQUE.

METHODS: MINE SPOILS OF DIFFERENT STAGES (AGES) WILL BE SELECTED. HABITAT COLLECTED WILL INCLUDE (1) AGE OF SPOIL, (2) AGE OF REHABILITATION, (3) KIND OF REHABILITATION - TO INCLUDE SPECIES SEEDED, ETC., (4) DENSITY AND COVER OF SEEDED PLANT SPECIES AND ALSO INVADING SPECIES, AND (5) MEASURE OF HETEROGENEITY OF HABITAT. TERRITORIAL BEHAVIOR BY MALES AND NESTING WILL BE INTENSIVELY MEASURED FROM APRIL THROUGH JUNE. UNDISTURBED NATIVE HABITATS WILL BE SIMILARLY SURVEYED FOR COMPARISON.

REPORTS AND PUBLICATIONS:

WORK PLAN: OCTOBER 1974

REPORTS: ESTABLISHMENT AND PROGRESS REPORTS WILL BE PREPARED AND ATTACHED AS SUPPLEMENTS TO THE STUDY PLAN.

00000033

PROJECT TITLE:
EFFECTS AND CONTROL OF JACKRABBIT UTILIZATION OF TREE AND SHRUB SPECIES PLANTED ON COAL SPOILS.

PROJECT NUMBER:
RM-1711-16

PROJECT SUPERVISOR:
ARDELL J. BJUGSTAD
RM-1711
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY
RAPID CITY, SD 57701

COOPERATOR/COORDINATOR:
AMAX COAL CO.

PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468

PRIMARY FUNDING AMOUNT:
3000

TIME FRAME:
09 01 74 TO 05 01 77

LOCATION:
WY

ABSTRACT:

PROBLEM: THE WHITE-TAILED JACKRABBIT (LEPUS TOWNSENDII) OF THE PRAIRIE OFTEN HEAVILY UTILIZES YOUNG WOODY GROWTH DURING WINTER SEASONS. SUCH USE IS OFTEN DETRIMENTAL AND IF SEVERE ENOUGH PREVENT THE ESTABLISHMENT OF WOODY PLANTS. ANNUAL GROWTH IS ALSO REDUCED WHEN UTILIZATION IS HEAVY.

OBJECTIVES: (1) TO DETERMINE IF USE BY WHITE-TAILED JACKRABBIT IS INFLUENTIAL ON THE SURVIVAL AND GROWTH OF TREES AND SHRUBS PLANTED ON COAL SPOILS AND (2) TO INVESTIGATE TWO METHODS OF CONTROL OF JACKRABBIT USE OF CERTAIN TREE AND SHRUB SPECIES.

METHODS: SEVEN SPECIES (FRAXINUS AMERICANA, ELAEAGNUS ANGUSTIFOLIA, SHEPHERDIA ARGENTEA, CARAGANA ABORESCENS, PRUNUS AMERICANA, PINUS PONDEROSA AND JUNIPERUS SCOPULORUM) WILL BE RANDOMLY ASSIGNED TO SEVEN ROWS IN EACH OF FIVE BLOCKS AT A RATE OF 45 PLANTS PER ROW. TWO TREATMENTS AND A CONTROL WILL BE RANDOMLY ASSIGNED TO SEGMENTS OF THE BLOCKS. TREATMENTS WILL BE (1) RABBIT-PROOF FENCE, REPELLENT AND NO PROTECTION. UTILIZATION WILL BE DETERMINED BY MEASURING BROWSED AND UNBROWSED TWIGS. A TIME-LAPSE CAMERA WILL BE INSTALLED TO MONITOR DAY USE. SURVIVAL AND GROWTH (BASED ON PLANT HEIGHT) OF TREES AND SHRUBS WILL ALSO BE MEASURED.

REPORTS AND PUBLICATIONS:

WORK PLAN: JULY 1974

REPORTS: ESTABLISHMENT AND PROGRESS REPORTS WILL BE PREPARED AND ATTACHED AS SUPPLEMENTS TO THE STUDY PLAN.

00000034

PROJECT TITLE:
SURVIVAL AND GROWTH OF SELECTED TREE AND SHRUB SPECIES ON COAL MINE SPOILS IN CAMPBELL COUNTY, WYOMING, AND ASSOCIATED SPOIL CHARACTERISTICS.

PROJECT NUMBER:
RM-807

INVESTIGATORS:
HOWARD K. ORR, HYDROLOGIST
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY
RAPID CITY, SD 57701

PROJECT SUPERVISOR:
ARDELL J. BJUGSTAD
RM-1711
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECH.
RAPID CITY, SD 57701

COOPERATOR/COORDINATOR:
AMAX COAL CO.

PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468

```
PRIMARY FUNDING AMOUNT:
   FY 74 - 6500
SECONDARY FUNDING AMOUNTS:
   FY 75 - 76  1000 PER YEAR
TIME FRAME:
   05 01 73 TO 05 01 75
LOCATION:
   WY
ABSTRACT:
    PROBLEM:  WHAT TREE AND SHRUB SPECIES CAN BE USED TO HELP
      STABILIZE MINE SPOILS AND BROADEN THE CHOICE OF OBJEC-
      TIVES OF REHABILITATION?
    OBJECTIVES:  TO DETERMINE ADAPTABILITY OF SELECTED SHRUB
      AND TREE SPECIES TO GROWING CONDITIONS ON SURFACE MINE
      SPOILS.  TO DETERMINE SPOIL PHYSIOCHEMICAL PROPERTIES
      WHICH MAY RELATE TO TREE/SHRUB ADAPTABILITY, AS COMPARED
      WITH NATURAL SOIL.
    METHODS:  A SINGLE ROW OF EACH OF 7 SPECIES IN EACH OF 5
      BLOCKS, 45 PLANTS PER ROW, PLANTS 6 FEET APART, ROWS 8
      FEET APART, BLOCKS 10 FEET APART.  ALL PLANTS WILL BE
      CHECKED AT LEAST TWICE EACH YEAR FOR SURVIVAL AND
      GROWTH.  SPECIES INCLUDED ARE:  GREEN ASH, RUSSIAN
      OLIVE, ROCKY MOUNTAIN JUNIPER, SILVER BUFFALOBERRY,
      PONDEROSA PINE, AMERICAN PLUM, AND SIBERIAN PEA SHRUB.
      SPOILS TO BE CORE AND BULK SAMPLED TO 54 INCHES FOR
      DETERMINATION OF PHYSIOCHEMICAL PROPERTIES AND VARIATION.
    STATISTICAL ANALYSIS:  ANOV AND ANOCV AND COVARIANCE OF
      BOTH PLANT AND SPOIL PHYSIOCHEMICAL PROPERTIES AND
      COMPARED WITH NATURAL SOIL.
REPORTS AND PUBLICATIONS:
   WORK PLAN:  MAY 1973
    REPORTS:  ESTABLISHMENT:  NOVEMBER 1973
              PROGRESS:       FALL 1974
              PROGRESS:       FALL 1975
              FINAL:          WINTER 1975 AND 1976


00000035
PROJECT TITLE:
   TIME TREND CHANGES IN PHYSIOCHEMICAL PROPERTIES OF
   EMPLACED COAL MINE SPOILS, CAMPBELL COUNTY, WYOMING
PROJECT NUMBER:
   RM-809
INVESTIGATORS:
   HOWARD K. ORR, HYDROLOGIST
   FOREST RESEARCH LAB.
   SOUTH DAKOTA SCHOOL OF MINES & TECH.
   RAPID CITY, SD  57701
PROJECT SUPERVISOR:
   ARDELL J. BJUGSTAD
   RM-1711
   FOREST RESEARCH LAB.
   SOUTH DAKOTA SCHOOL OF MINES & TECH.
   RAPID CITY, SD  57701
COOPERATOR/COORDINATOR:
   AMAX COAL CO.; SOUTH DAKOTA SCHOOL OF MINES & TECH.; SOUTH
   DAKOTA STATE UNIV.
PRIMARY SPONSOR:
   SURFACE ENVIRONMENT AND MINING
   145 GRAND AVE.
   BILLINGS, MT  59102
   406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
   STARTING FY 75 - 4750 FOR 3 YEARS
TIME FRAME:
   01 01 74 TO 12 30 77
LOCATION:
   WY
ABSTRACT:
   PROBLEM:  WHAT, IF ANY, PHYSIOCHEMICAL CHANGES TAKE PLACE
   IN COAL MINE SPOILS AFTER EMPLACEMENT WHICH MAY DETER
   OR IMPROVE REHABILITATION POTENTIAL.
   OBJECTIVES:  TO DETERMINE IF THERE ARE PHYSIOCHEMICAL
   CHANGES IN MINE SPOILS UPON DIRECT EXPOSURE TO
   ATMOSPHERE THAT MAY INFLUENCE ITS STABILITY AND PLANT
   GROWTH POTENTIAL.
   METHODS:  IN REPRESENTATIVE AREAS SAMPLE EMPLACED MINE
   SPOILS AND NATURAL SOIL IN THE DIRECTION OF MINE
   DEVELOPMENT.  SAMPLE SOON AFTER SPOIL IS EMPLACED AND
   FINISHED.  BOTH CORE AND BULK SAMPLES WILL BE COLLECTED
   TO 54 INCHES DEPTH NEAR THE SAME TIME EACH YEAR OF THE
   STUDY DURATION.  SAMPLES WILL BE ANALYZED FOR BULK
   ANALYSIS, AND FOR CHEMICAL PROPERTIES.
   STATISTICAL ANALYSIS:  RESULTS WILL BE COMPARED BY YEARS
   (ANCV) TO DETERMINE IF THERE ARE SIGNIFICANT CHANGES IN
   STABILITY AND PRODUCTIVITY POTENTIAL.
   ESTABLISHMENT AND PROGRESS:  FALL 1974
   PROGRESS:  FALL 1975
   PROGRESS:   FALL 1976
   FINAL:   WINTER 1977


00000036
PROJECT TITLE:
   PREMINING EVALUATION OF OVERBURDEN AT COAL STRIP-MINING
   AREAS OF POWDER RIVER BASIN, WYOMING-MONTANA
PROJECT NUMBER:
   RM-[illegible]12
INVESTIGATORS:
   TERUO YAMAMOTO
   RM-1662
   FOREST RESEARCH LAB.
   SOUTH DAKOTA SCHOOL OF MINES & TECH.
   RAPID CITY, SD  57701
PROJECT SUPERVISOR:
   ARDELL J. BJUGSTAD
```

RM-1711
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECH.
RAPID CITY, SD 57701
COOPERATOR/COORDINATOR:
ATLANTIC-RICHFIELD CO.; AMERICAN METAL CLIMAX FOUNDATION, INC.; BLACK HILLS POWER AND LIGHT CO.; WESTERN ENERGY CO.; PEABODY COAL CO.
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
FY 75 - 10,000
FY 76 - 77 - 8000 PER YEAR
LOCATION:
MT WY
ABSTRACT:

PROBLEM: ANALYSIS OF OVERBURDEN ABOVE COAL - THEIR COMPOSITION AND VARIABILITY - IS NEEDED TO FORMULATE A BASIS FOR PREDICTING OVERBURDEN CHARACTERISTICS IN THE POWDER RIVER BASIN. SUCH A PREDICTIVE BASIS IS FUNDAMENTAL IN PLANNING MINING OPERATIONS AND IN THE MOST FAVORABLE SEQUENCING OF OVERBURDEN MATERIAL AT RECLAMATION AREAS.

OBJECTIVES: SPECIFIC OBJECTIVES ARE TO: 1. SAMPLE OVERBURDEN MATERIAL BY DRILLING TO TOP OF COAL BED, 2. OBTAIN RADIOACTIVITY AND ELECTRIC LOG DATA IN BORE HOLES, 3. DISTINGUISH LITHOLOGIC TYPES FROM SURFACE TO TOP OF COAL BEDS, 4. DETERMINE PHYSICAL, CHEMICAL, MINERALOGIC, AND GEOPHYSICAL CHARACTERISTICS, CORRELATE GEOLOGICALLY THE BEDDING OF OVERBURDEN ABOVE COAL, AND 6. DETERMINE WHETHER A PREDICTABLE PHYSICAL OR CHEMICAL BASIS OF OVERBURDEN CHARACTERISTIC DOES EXIST IN THE ANTICIPATED COAL MINING AREAS.

METHODS: TWELVE DRILLING SITES WILL BE SELECTED BY FIELD, MAP, GEOPHYSICAL RECONNAISSANCE WITHIN THE POWDER RIVER BASIN ARBITRARILY SUBDIVIDED INTO NORTHERN, MIDDLE, AND SOUTHERN AREAS. PRIMARY DRILLING SITE SELECTION CRITERION WILL BE OVERBURDEN DEPTH OF LESS THAN 50 FEET. SAMPLES WILL BE COLLECTED BY COMPLETE CORING DOWN TO THE TOP OF COAL BED. GEOPHYSICAL HOLE LOGGING WILL BE DONE BY STANDARD METHODS. STANDARD AGRICULTURAL SOIL ANALYTICAL TECHNIQUES AND X-RAY DIFFRACTION METHODS WILL BE USED TO CHARACTERIZE THE PHYSICAL-CHEMICAL AND MINERALOGY OF OVERBURDEN MATERIALS.

STATISTICAL ANALYSIS: ANALYTICAL DESIGNS WILL BE FORMULATED WITH ACTUAL DATA GATHERING AND FAMILIARITY WITH ASSOCIATED PROBLEMS.

REPORTS AND PUBLICATIONS:
WORK PLAN: JUNE 30, 1974
ESTABLISHMENT: AUGUST 1975. INTERIM: ANNUAL - MAY 1975.
FINAL: MAY 1977.

00000037
PROJECT TITLE:
IN VITRO TAILORING OF PLANT GENOTYPES FOR THE RECLAMATION OF DISTURBED AREAS.
COMMODITY: GENERAL APPLICABILITY
PROJECT NUMBER:
INT-1603-SEM-4
INVESTIGATORS:
DR. JOHN SIMMONS
COLLEGE OF SCIENCE, UTAH STATE UNIV.
UTAH STATE UNIV.
LOGAN, UT 84321
PROJECT SUPERVISOR:
F. E. PACKER
INTERMTN. FOREST & RANGE EXP. STATION
FORESTRY SCIENCES LAB.
860 N. 12TH EAST
LOGAN, UT 84321
COOPERATOR/COORDINATOR:
UTAH STATE UNIV.
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
25,000
TIME FRAME:
07 01 74 TO 06 30 75
LOCATION:
UT
ABSTRACT:

PROBLEM: REVEGETATION OF BOTH ACID AND ALKALINE MINE SPOILS WILL, IN SOME CASES, REQUIRE PLANT ECOTYPES HAVING GREATER TOLERANCES FOR ADVERSE ENVIRONMENTAL CONDITIONS THAN OCCURS NATURALLY. ALL AVENUES TO OBTAIN GENOTYPES WITH HIGHER TOLERANCE THRESHOLDS MUST BE EXPLORED. TISSUE OR CELL CULTURING FOR INDUCED GENETIC VARIABILITY HOLDS GOOD PROMISE FOR OBTAINING THE NEEDED NEW GENOTYPIC PLANT MATERIALS.

OBJECTIVES: TO FOCUS VARIOUS TISSUE CULTURE TECHNIQUES NOW AVAILABLE ON THE MANIPULATION OF THE GENOME OF SELECTED PLANTS IN SUCH A FASHION AS TO PRODUCE DESIRABLE HERITABLE CHANGE. THE AIM IS PLANT IMPROVEMENT FOR MEETING VARIOUS ADVERSE CONDITIONS ON MINE SPOILS.

METHODS AND ANALYSIS: LABORATORY AND GREENHOUSE METHODS.

REPORTS AND PUBLICATIONS:
WORK PLAN: JULY 15, 1974
FINAL: JUNE 30, 1975

00000038

PROJECT TITLE:
ESTABLISHMENT OF MICROBIAL POPULATIONS IN STERILE MINE SPOILS AND OVERBURDEN
COMMODITY: COAL

PROJECT NUMBER:
INI-1603-SEM-3

INVESTIGATORS:
DON PORCELLA
UTAH WATER RESEARCH LAB., UTAH STATE UNIV.
LOGAN, UT 84321

PROJECT SUPERVISOR:
P. E. PACKER
INTERMTN. FOREST & RANGE EXP. STATION
FORESTRY SCIENCES LAB.
860 N. 12TH EAST
LOGAN, UT 84321

COOPERATOR/COORDINATOR:
UTAH STATE UNIV.

PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 x6468

PRIMARY FUNDING AMOUNT:
16,000

TIME FRAME:
07 15 74 TO 10 31 75

LOCATION:
ID MT CA

ABSTRACT:

PROBLEM: THE REVEGETATION OF MINE SPOILS IS OFTEN A LENGTHY PROCESS DUE TO TOXICITY, NUTRIENT IMBALANCE, AND LACK OF A STABLE MICROFLORA. ESTABLISHMENT OF MICROBIAL ACTIVITY IN STERILE MINE SPOILS WOULD PROBABLY IMPROVE THE RATE AND DEGREE OF VEGETATION SUCCESS.

OBJECTIVES: CHARACTERIZE THE MINE SPOIL MICROFLORA ON THE BLACKBIRD, DECKER, BALLARD, AND LEVIATHAN MINES AND DEVELOP A BIOASSAY TECHNIQUE TO DEVELOP BEST MICROFLORA FOR EACH.

METHODS AND ANALYSES: SAMPLING USING EPIFLUORENT MICROSCOPY, SOIL CHLOROPHYLL ANALYSES, NITROGEN AND CARBON FIXATION RATES.

REPORTS AND PUBLICATIONS:
WORK PLAN: JULY 15, 1974
FINAL: OCTOBER 1, 1975

00000039

PROJECT TITLE:
A CLASSIFICATION OF SURFACE-MINE SPOILS IN UTAH BASED ON THEIR HYDROLOGIC, EROSIONAL, AND WATER CHEMISTRY CHARACTERISTICS.
COMMODITY: GENERAL APPLICABILITY

PROJECT NUMBER:
INI-1603-SEM-2

INVESTIGATORS:
DR. R. W. HAWKINS
COLLEGE OF NATURAL RESOURCES, UTAH STATE UNIV.
LOGAN, UT 84321

PROJECT SUPERVISOR:
P. E. PACKER
INTERMTN. FOREST & RANGE EXP. STATION
FORESTRY SCIENCES LAB.
860 N. 12TH EAST
LOGAN, UT 84321

COOPERATOR/COORDINATOR:
UTAH STATE AGRICULTURAL EXP. STATION

PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 x6468

PRIMARY FUNDING AMOUNT:
20,500

LOCATION:
UT

ABSTRACT:

PROBLEM: MANY MINE SPOILS THROUGHOUT THE STATE OF UTAH ARE CONTRIBUTING SEDIMENT, SURFACE RUNOFF, ACID AND ALKALI POLLUTANTS AND HEAVY METALS TO STREAMS AND OTHER WATER SUPPLIES. KNOWLEDGE CONCERNING THE PRODUCTION CHARACTERISTICS OF THESE SPOILS IS NEEDED.

OBJECTIVES: TO MEASURE AND RELATE VALUES OF SURFACE HYDROLOGY AND EROSION PARAMETERS TO VALUES OF VARIOUS SITE FACTORS THAT CHARACTERIZE MINE SPOILS IN UTAH.

METHODS AND ANALYSIS: 1. UNIVERSITY AND FOREST SERVICE SELECT STUDY SITES JOINTLY.
2. AT EACH STUDY SITE MEASURE SITE FACTORS SELECTED.
3. AT EACH STUDY SITE MEASURE RUNOFF, EROSION, AND WATER QUALITY ON RAINFALL-SIMULATING INFILTROMETER PLOTS. REGRESSION ANALYSES.

REPORTS AND PUBLICATIONS:
WORK PLAN: JULY 15, 1974
FINAL: OCTOBER 1975

00000040
PROJECT TITLE:
PHYSIOLOGICAL RESISTANCE TO DROUGHT STRESS OF PLANT SPECIES USED FOR SURFACE MINE REVEGETATION
PROJECT NUMBER:
INT-SIH-2
INVESTIGATORS:
RAY W. BROWN
PROJECT SUPERVISOR:
P. E. PACKER
INTERMTN. FOREST & RANGE EXP. STATION
FORESTRY SCIENCES LAB.
860 N. 12TH EAST
LOGAN, UT 84321
COOPERATOR/COORDINATOR:
DR. WALTER T. MCDONOUGH INT-1751
DR. HERMAN H. WIEBE - UTAH STATE UNIV.
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
1974 - 18,300
11,500 PER YEAR THEREAFTER
TIME FRAME:
03 01 74 TO 06 30 78
LOCATION:
UT
ABSTRACT:

PROBLEM: ONE OF THE MOST SEVERE LIMITING ENVIRONMENTAL FACTORS TO THE ESTABLISHMENT OF VEGETATION ON DISTURBED SITES IN THE WEST IS THE AVAILABILITY OF WATER FOR PLANT GROWTH. DIFFERENT PLANT SPECIES HAVE DIFFERENT PHYSIOLOGICAL CAPABILITIES OF WITHSTANDING WATER STRESS, AND THIS VARIES WITH ENVIRONMENTAL CONDITIONS. SELECTION OF ADAPTED PLANT SPECIES REQUIRES A BASIC UNDERSTANDING OF THEIR PHYSIOLOGICAL REQUIREMENTS AND TOLERANCE TO THE LIMITING ENVIRONMENTAL FACTORS AFFECTING THEIR WATER RELATIONS.

OBJECTIVES: TO DETERMINE THE RELATIONSHIPS BETWEEN WILTING AND THE LETHAL THRESHOLDS OF INTERNAL WATER STATUS IN PLANT TISSUES WITH THE SOIL AND ATMOSPHERIC WATER STATUS. TO DETERMINE THE RANGE OF WATER AVAILABILITY WITHIN WHICH EACH SPECIES IS CAPABLE OF MAINTAINING GROWTH AND SURVIVAL FOR THE COMPETITION OF ITS ENTIRE LIFE CYCLE.

METHODS: LABORATORY AND FIELD STUDIES WILL BE REQUIRED; CAREFULLY CONTROLLED CONDITIONS IN A GROWTH CHAMBER WILL BE USED TO ESTABLISH QUANTITATIVE WILTING AND LETHAL POINTS. FIELD RESEARCH WILL BE CONDUCTED TO ESTABLISH RESPONSES UNDER ACTUAL CONDITIONS.

STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE AND T-TESTS; PROGRAMS ALREADY ESTABLISHED.

REPORTS AND PUBLICATIONS:
STUDY PLAN: MARCH 1974
PROGRESS REPORTS WILL BE PREPARED ANNUALLY, AND PUBLICATION WILL FOLLOW PERIODICALLY.

00000041
PROJECT TITLE:
REMOTE SENSING ESPECIALLY DESIGNED FOR REVEGETATION OF AREAS DISTURBED BY SURFACE MINING
COMMODITY: GENERAL APPLICABILITY
PROJECT NUMBER:
SEAM: INT-SEM-1
INVESTIGATORS:
DR. INGE DIRMHIRN
UTAH STATE UNIV.
LOGAN, UT 84321
EUGENE E. FARMER
INTERMTN. FOREST & RANGE EXP. STATION
FORESTRY SCIENCES LAB.
860 N. 12TH EAST
LOGAN, UT 84321
PROJECT SUPERVISOR:
ELAND Z. RICHARDSON
INTERMTN. FOREST & RANGE EXP. STATION
FORESTRY SCIENCES LAB.
860 N. 12TH EAST
LOGAN, UT 84321
COOPERATOR/COORDINATOR:
SALMON NATIONAL FOREST; NATIONAL CENTER FOR ATMOSPHERIC RESEARCH; BOISE INTERAGENCY FIRE CENTER; NATIONAL HAIL RESEARCH CENTER, USFS, REGION 4
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
16,000
TIME FRAME:
06 01 74 TO 10 30 74
LOCATION:
UT
ABSTRACT:

PROBLEM: AS SURFACE MINING ACCELERATES TO MEET RAPIDLY INCREASING ENERGY NEEDS, BOTH GOVERNMENT AND INDUSTRY WILL BE REQUIRED TO INSURE THAT ESSENTIAL MINERALS CAN BE EXTRACTED WITH A MINIMUM OF HARM TO THE ENVIRONMENT. CONSIDERATIONS OF THE SURFACE MICROENVIRONMENT UNDER WHICH VEGETATION IS TO BE INITIATED

ARE OF VITAL IMPORTANCE. GREAT DIFFERENCES IN THIS MICROENVIRONMENT OCCUR OVER SHORT DISTANCES. THESE DIFFERENCES DICTATE THE PROBABILITY OF SUCCESS OF A REVEGETATION PROGRAM. IN THE INTERIOR WEST LITTLE INFORMATION IS AVAILABLE WHICH INDICATES THE CHANGES IN ENVIRONMENT DUE TO SURFACE MINING ACTIVITY. IN ADDITION, TECHNIQUES FOR EVALUATING THE PRE-MINING ENVIRONMENT AND ITS DISPOSITION TO LATER RECLAMATION ARE VIRTUALLY NONEXISTENT.

OBJECTIVES: 1. TO DETERMINE THE SURFACE TEMPERATURE OF AREAS DISTURBED BY MINING ACTIVITIES, PARTICULARLY WITH RESPECT TO THEIR EXTREMES.

2. TO MAKE AN AERIAL INVENTORY OF PERTINENT GROUND CHARACTERISTICS OF THE AREA BY COLOR AND INFRA-RED PHOTOGRAPHY.

3. TO PROVIDE THE NECESSARY GROUND TRUTH MEASUREMENTS FOR THE AIRBORNE TECHNIQUES.

4. TO COMBINE THESE TECHNIQUES TO PROVIDE A CLASSIFICATION OF GROUND AREAS.

5. TO MAKE NECESSARY GROUND MEASUREMENTS OF UNFAVORABLE AND LESS FAVORABLE AREAS TO DETERMINE MICROSITUATIONS WHERE GROWTH COULD BE STARTED DESPITE THE OVERALL MESOSCALE NEGATIVE CONDITIONS.

METHODS: AN AERIAL INSTRUMENT PACK WILL CONSIST OF AN IR THERMOMETER, A TIROS RADIOMETER, TWO HIGH RESOLUTION CAMERA, AND A THERMAL LINE SCANNER. OVER-FLIGHTS WILL BE MADE BETWEEN 2000 AND 3000 FEET OVER GROUND LEVEL. SIMULTANEOUS GROUND MEASUREMENTS WITH SIMILAR INSTRUMENTS WILL PROVIDE CHECK POINTS FOR THE FLIGHT DATA. GROUND CHECK DATA HAS ALREADY PROVEN TO BE SUCCESSFUL IN SATELLITE AND AIRCRAFT REMOTE SENSING INVESTIGATIONS.

REPORTS AND PUBLICATIONS:
FINAL: OCTOBER 4, 1974.

00000042
PROJECT TITLE:
EFFECTS OF DIFFERENT REHABILITATION TREATMENT METHODS ON SURFACE RUNOFF QUANTITY AND QUALITY AND EROSIONAL BEHAVIOR OF SURFACE MINE SPOILS IN THE INTERMOUNTAIN WEST
PROJECT NUMBER:
INT-1603-SIN-11
PROJECT SUPERVISOR:
P. E. PACKER
INTERMTN. FOREST & RANGE EXP. STATION
FORESTRY SCIENCES LAB.
860 N. 12TH EAST
LOGAN, UT 84321
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
5000 PER YEAR
TIME FRAME:
01 01 74 TO 12 30 78
LOCATION:
ID MT
ABSTRACT:

PROBLEM: WHERE SURFACE RUNOFF AND EROSION FROM MINE SPOILS HOLD POTENTIALS FOR DAMAGING WATER QUALITY AND OTHER ELEMENTS OF THE ENVIRONMENT, THERE IS A NEED TO EVALUATE ALTERNATIVE REHABILITATION MEASURES TO DETERMINE WHICH ARE MOST EFFECTIVE FOR REDUCING OR PREVENTING ADVERSE ENVIRONMENTAL IMPACTS.

OBJECTIVES: TO DETERMINE THE RELATIVE EFFECTIVENESS OF ALTERNATIVE SURFACE MINE REHABILITATION METHODS FOR STABILIZING THE RUNOFF AND EROSIONAL REGIMES.

METHODS AND ANALYSIS: SEMI-PERMANENT RUNOFF AND EROSION PLOTS INSTALLED IN THE FIELD; RESULTS SUBJECTED TO VARIANCE ANALYSES.

REPORTS AND PUBLICATIONS:
WORK PLAN: 1973
FINAL: OCTOBER 15, 1978

00000043
PROJECT TITLE:
PHOTO INTERPRETATION AS A TOOL FOR ASSESSING THE REVEGETATION OF SURFACE MINED AREAS.
PROJECT NUMBER:
INT-SIN-10
INVESTIGATORS:
BLAND Z. RICHARDSON
PROJECT SUPERVISOR:
P. E. PACKER
INTERMTN. FOREST & RANGE EXP. STATION
FORESTRY SCIENCES LABORATORY
860 N. 12TH EAST
LOGAN, UT 84321
COOPERATOR/COORDINATOR:
SALMON NATIONAL FOREST
CUSTER NATIONAL FOREST
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
1973 - 6000
2500 PER YEAR SUCCEEDING YEARS
TIME FRAME:
07 01 73 TO 07 01 78

LOCATION:
MT ID
ABSTRACT:
PROBLEM: NORMAL PLOT ASSESSMENT TECHNIQUES OF REVEGETATION EFFORTS DO NOT PROVIDE AS COMPLETE A RECORD OF STAND CHARACTERISTICS AS IS OFTEN DESIRED. MOREOVER, STANDARD TECHNIQUES ARE SLOW, TEDIOUS, AND COSTLY. PHOTOGRAPHIC TECHNIQUES WOULD PROVIDE A PERMANENT RECORD OF STAND CHARACTERISTICS WHICH THE INVESTIGATOR CAN REFER TO AT ANY TIME.
OBJECTIVES:
1. TO PROVIDE A PERMANENT PICTORIAL RECORD OF REVEGETATION PLOTS AT SUCCESSIVE TIME INTERVALS.
2. TO DEVELOP PHOTOGRAMMETRIC TECHNIQUES OF DATA COLLECTION.
METHODS: VARIOUS PHOTOGRAPHIC TECHNIQUES, INCLUDING STEREOSCOPIC PAIRS OF PHOTOGRAPHS, WILL BE USED TO RECORD A PICTORIAL HISTORY OF PLOT DEVELOPMENT. DIFFERENT ANALYSIS PROCEDURES USING THESE PHOTOGRAPHS WILL BE EVALUATED BASED ON PLOTS OF KNOWN STAND CHARACTERISTICS.
RESULTS: THIS STUDY WILL RESULT IN A LIST OF PROCEDURES, TECHNIQUES, AND EQUIPMENT NEEDED FOR PHOTOGRAPHIC EVALUATION OF VEGETATION. EVALUATIONS WILL BE MADE TO DETERMINE THE FEASIBILITY OF FACILITATING SPECIES IDENTIFICATION, PLANT DENSITY, AND OTHER CRITICAL STAND CHARACTERISTICS.

00000044
PROJECT TITLE:
DEMONSTRATION OF REVEGETATION TECHNIQUES.
PROJECT NUMBER:
INT-1603-SEM-10
INVESTIGATORS:
FRANK KENNEY
DECKER COAL CO.
C\O PETER KIEWIT & SONS
SHERIDAN, WY 82801
PROJECT SUPERVISOR:
ELAND Z. RICHARDSON
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321
COOPERATOR/COORDINATOR:
PETER-KIEWIT CONSTRUCTION CO.
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
5000
TIME FRAME:
01 01 74 TO 01 15 77
LOCATION:
MT
ABSTRACT:
PROBLEM: THE DECKER COAL COMPANY HAS A SUBSTANTIAL AREA OF NEW MINE SPOILS. THE STATE OF MONTANA PRESCRIBES STANDARDS FOR REHABILITATING SUCH SPOILS. THE INTERMOUNTAIN STATION HAS RESEARCH PLOTS THAT HAVE NOW PROVIDED SOME ALTERNATIVE REHABILITATION TREATMENTS TO TEST AND DEMONSTRATE ON A LARGER SCALE OF SEVERAL ACRES.
OBJECTIVES: TO PLAN AND INSTALL A DEVELOPMENTAL APPLICATION DEMONSTRATION ON THE DECKER COAL MINE OF REHABILITATION METHODS DEVELOPED ON RESEARCH AREAS AT THE DECKER MINE.
METHODS AND ANALYSES: COMPARISONS OF SEVERAL ALTERNATIVE REVEGETATION METHODS BY ACTUAL DEMONSTRATION ON LARGE AREAS.
REPORTS AND PUBLICATIONS:
WORK PLAN: JULY 15, 1974
PROGRESS REPORT: JANUARY 15, 1975
FINAL: JANUARY 15, 1977

00000045
PROJECT TITLE:
REPRODUCTION BIOLOGY OF GENUS ARTEMISIA L. IN EASTERN MONTANA.
PROJECT NUMBER:
INT-1603-SEM-9
INVESTIGATORS:
DR. THAD WEAVER
MONTANA STATE UNIVERSITY
BOZEMAN, MT 59715
PROJECT SUPERVISOR:
R. W. BROWN
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321
COOPERATOR/COORDINATOR:
STATE OF MONTANA DEPARTMENT OF FISH AND GAME
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
10000
TIME FRAME:
01 01 74 TO 06 30 76
LOCATION:
MT

ABSTRACT:

PROBLEM: A NUMBER OF ARTEMISIA (SAGEBRUSH) SPECIES IN EASTERN MONTANA SERVE BOTH AS FOOD AND COVER FOR WILDLIFE AND AS COVER AND FORAGE SPECIES ON SURFACE-MINED LANDS. BETTER UNDERSTANDING OF THE REPRODUCTIVE BIOLOGY OF THESE PLANTS IS ESSENTIAL TO IMPROVING THEIR USES FOR WILDLIFE AND FOR SURFACE MINE RECLAMATION.

OBJECTIVES: TO DETERMINE AND COMPARE THE REPRODUCTION CHARACTERISTICS OF SIX ARTEMISIA (SAGEBRUSH) SPECIES CONSIDERED REPRESENTATIVE OF THE GENUS IN EASTERN MONTANA WITH RESPECT TO SUITABILITY FOR REVEGETATING SURFACE-MINED AREAS.

METHODS AND ANALYSES:

1. FIELD STUDIES OF PHEOLOGICAL AND PHYSIOLOGICAL DEVELOPMENT OF PLANTS.
2. LABORATORY STUDIES OF SEED GERMINATION AND VEGETATIVE PROPAGATION POTENTIALS.

REPORTS AND PUBLICATIONS:
WORK PLAN: JULY 15, 1974
PROGRESS: NONE
FINAL: JUNE 30, 1976

00000046
PROJECT TITLE:
EFFECTS OF FERTILIZER RATE AND TIME OF APPLICATION ON A MINE SPOIL REHABILITATION SEEDING.
PROJECT NUMBER:
INT-1603-SEM-8
INVESTIGATORS:
DR. R. L. MEYN
MONTANA AGRICULTURAL EXPERIMENTAL STATION
MONTANA STATE UNIVERSITY
BOZEMAN, MT 59715
PROJECT SUPERVISOR:
P. E. PACKER
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321
COOPERATOR/COORDINATOR:
MONTANA STATE UNIVERSITY
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
25000
TIME FRAME:
01 01 74 TO 06 30 75
LOCATION:
MT

ABSTRACT:

PROBLEM: REHABILITATION OF COAL SURFACE MINE SPOILS ON THE NORTHERN GREAT PLAINS DEPENDS ON RAPID DEVELOPMENT OF A MIXTURE OF INTRODUCED SPECIES AND NATIVE SPECIES THAT GROW SLOWER BUT ARE MORE PERMANENTLY ADAPTED TO THE ENVIRONMENT. THE ROLE OF FERTILIZERS IN ENHANCING RAPID PLANT COVER DEVELOPMENT NEEDS INVESTIGATION.

OBJECTIVES: TO DETERMINE RATES OF ESTABLISHMENT, PRODUCTIVITY, AND SURVIVAL OF NATIVE AND INTRODUCED GRASSES, LEGUMES, AND SHRUBS AS AFFECTED BY FERTILIZER APPLICATIONS.

METHODS AND ANALYSES: FIELD PLOT TECHNIQUES AND VARIANCE ANALYSES.

REPORTS AND PUBLICATIONS:
WORK PLAN: JULY 15, 1974
PROGRESS: NONE
FINAL: JUNE 30, 1975
07 01 74 TO 07 01 79

00000047
PROJECT TITLE:
PERFORMANCE OF INDIVIDUAL SPECIES IN VARIOUS GRASS MIXTURES GROWING ON MINE OVERBURDEN PILES.
PROJECT NUMBER:
SURFACE ENVIRONMENT AND MINING: INT-SIH-8
INVESTIGATORS:
RAY BROWN
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321
EUGENE FARMER
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321
PROJECT SUPERVISOR:
PAUL PACKER
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
800 PER YEAR
LOCATION:
ID MT

ABSTRACT:

PROBLEM: THE GROWTH AND DEVELOPMENT OF GRASSES VARIES WIDELY WITH SPECIES, GEOGRAPHICAL LOCATION, ENVIRONMENTAL CONDITIONS, AND SEASON. ALSO, SPECIES OF GRASSES RESPOND DIFFERENTLY TO COMPETITIVE PRESSURES UNDER VARYING CONDITIONS. EVALUATION OF SPECIES RESPONSES GROWING IN MIXTURES IN FIELD PLOTS WOULD BE VALUABLE FOR SELECTING INDIVIDUAL SPECIES FOR FUTURE REVEGETATION EFFORTS. HOWEVER, DETERMINING THIS RESPONSE IS DIFFICULT. THE 448 EXISTING FIELD PLOTS OFFER A UNIQUE OPPORTUNITY FOR DETERMINATION OF THESE RESPONSES FOR APPROXIMATELY 30 SPECIES OF GRASSES.

OBJECTIVES: THE PRIMARY OBJECTIVE IS TO EVALUATE INTER-SPECIES COMPARISONS OF PRODUCTION, DENSITY, SEED PRODUCTION AND VIGOR.

METHODS: STANDARD ASSESSMENT PROCEDURES ON THE EXISTING FIELD STUDY PLOTS INCLUDE MEASURES OF DENSITY AND PRODUCTION BY SPECIES. THESE DATA WILL PERMIT MANY OF THE DESIRED INTER-SPECIES COMPARISONS.

RESULTS: INTER-SPECIES COMPARISONS OF DENSITY, DRY MATTER PRODUCTION, VIGOR, ETC., WILL PERMIT THE FORMULATION OF COMPARATIVE VALUES INDICATING SPECIES ADAPTABILITY UNDER A GIVEN SET OF ENVIRONMENTAL CONDITIONS. THESE DATA PROVIDE A QUANTITATIVE ASSESSMENT OF WHICH SPECIES ARE PERFORMING MOST SATISFACTORILY.

00000048

PROJECT TITLE:

A RECONNAISSANCE SURVEY OF THE DECKER MINE SPOIL TYPES AND THEIR HYDROLOGIC RESPONSES.

COMMODITY: COAL

PROJECT NUMBER:

SURFACE ENVIRONMENT AND MINING: INT-SIH-4

INVESTIGATORS:

EUGENE E. FARMER
BLAND Z. RICHARDSON
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321

PROJECT SUPERVISOR:

F. E. PACKER
INTERMTN. FOREST & RANGE EXP. STATION
FORESTRY SCIENCES LAB.
860 N. 12TH EAST
LOGAN, UT 84321

COOPERATOR/COORDINATOR:

DECKER COAL CO.

PRIMARY SPONSOR:

SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468

PRIMARY FUNDING AMOUNT:

3000

TIME FRAME:

07 01 73 TO 07 01 74

LOCATION:

MT

ABSTRACT:

PROBLEM: THE OPERATIONAL CHARACTER OF SURFACE MINING METHODS DICTATES THAT BARE OVERBURDEN MATERIALS SHALL BE EXPOSED TO EROSIONAL FORCES FROM THE TIME OF MINING UNTIL THEIR SUCCESSFUL REVEGETATION. THERE IS LITTLE EXISTING INFORMATION ON THE WAYS IN WHICH THESE BARE OVERBURDEN PILES HANDLE METEORIC WATER, NOR ON THE MAGNITUDE OF SURFACE EROSION ORIGINATING ON THESE PILES.

OBJECTIVES:

1. TO ESTIMATE THE INFILTRATION CAPACITY OF GRADED AND UNGRADED SURFACE MINE OVERBURDEN.
2. TO ASSESS THE MAGNITUDE OF SURFACE EROSION CREATED BY HIGH INTENSITY RAINFALL.

METHODS: THE ROCKY MOUNTAIN INFILTROMETER WILL BE USED IN THE DETERMINATION OF INFILTRATION RATES THROUGH THE APPLICATION OF ARTIFICIAL RAINFALL. THIS EQUIPMENT WILL BE OPERATED ON BOTH GRADED AND UNGRADED SPOIL MATERIALS AND THE RESULTING SEDIMENTS WILL BE COLLECTED AND ANALYZED.

RESULTS: RESULTS WILL GIVE A SEMI-QUANTITATIVE INDICATION OF THE INFILTRATION AND ERODABILITY CHARACTERISTICS OF VARIOUS SPOIL TYPES. THESE DATA WILL ALSO PERMIT AN ASSESSMENT OF RELATIVE ERODABILITIES BY SPOIL TYPE, PHYSIOGRAPHY, AND DEGREE OF MECHANICAL MANIPULATION.

A REPORT IS CURRENTLY BEING WRITTEN.

00000049

PROJECT TITLE:

THE REVEGETATION OF AREAS DISTURBED BY SURFACE MINING ACTIVITIES.

COMMODITIES: COAL, COBALT, COPPER, PHOSPHATE

PROJECT NUMBER:

INT-SIH-1

INVESTIGATORS:

BLAND Z. RICHARDSON; RAY W. BROWN; EUGENE E. FARMER
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321

PROJECT SUPERVISOR:

PAUL E. PACKER
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321

```
COOPERATOR/COORDINATOR:
   HANNA MINING CO.
   DECKER COAL CO.
   MONSANTO CHEMICAL CO.
   AMERICAN METALS CLIMAX, INC.
   SALMON NATIONAL FOREST
   CUSTER NATIONAL FOREST
   CARIBOU NATIONAL FOREST
PRIMARY SPONSOR:
   SURFACE ENVIRONMENT AND MINING
   145 GRAND AVE.
   BILLINGS, MT  59102
   406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
   1972 - 46,000
   1973 & 1974 - 42,000 PER YEAR
TIME FRAME:
   07 01 72 TO 07 01 75
   PERIODIC REMEASUREMENT FOR ADDITIONAL 2 YEARS
LOCATION:
   MI  ID
ABSTRACT:
    PROBLEM:  THIS IS A LARGE STUDY DIRECTED AT MANY PROBLEMS
      THAT ARE BASIC TO THE SUCCESSFUL REVEGETATION OF
      SURFACE MINES.  THESE PROBLEMS SPELLED OUT IN THE STUDY
      PLAN, 78 PAGES.
    OBJECTIVES:
      1. DETERMINE THE MINIMUM COMBINATION OF TREATMENTS
      NECESSARY TO ACHIEVE AN ACCEPTABLE STAND OF GRASS,
      SHRUBS, AND TREES.
      2. TO ASSESS THE SHORT- AND LONG-TERM MERITS OF GRASS
      MIXTURE CONSISTING OF (A) ALL INTRODUCED GRASSES,
      (B) ALL NATIVE GRASSES, AND (C) NATIVE PLUS INTRODUCED
      GRASSES.
      3. TO ASSESS THE FEASIBILITY OF REVEGETATION METHODS
      OTHER THAN DIRECT SEEDING.
      4. TO EVALUATE THE INFLUENCES OF VARIOUS SOIL CULTURAL
      PRACTICES UPON STAND ESTABLISHMENT.


0000050
PROJECT TITLE:
     HYDROMULCHING AS AN ALTERNATIVE MULCHING
      METHOD ON SURFACE MINE DISTURBANCES.
   COMMODITIES:  COAL, COPPER, COBALT, PHOSPHATE, GOLD
PROJECT NUMBER:
     SURFACE ENVIRONMENT AND MINING: INT-SIH-5
INVESTIGATORS:
   BLAND Z. RICHARDSON; EUGENE E. FARMER
   INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
   FORESTRY SCIENCES LABORATORY
   860 NORTH 12TH EAST
   LOGAN, UT  84321
PROJECT SUPERVISOR:
   P. E. PACKER
   INTERMTN. FOREST & RANGE EXP. STATION
   FORESTRY SCIENCES LAB.
   860 N. 12TH EAST
   LOGAN, UT  84321
COOPERATOR/COORDINATOR:
   CUSTER NATIONAL FOREST
   SALMON NATIONAL FOREST
   HANNA MINING CO.
   DECKER COAL CO.
PRIMARY SPONSOR:
   SURFACE ENVIRONMENT AND MINING
   145 GRAND AVE.
   BILLINGS, MT  59102
   406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
   4500 PER YEAR
TIME FRAME:
   10 01 73 TO 10 01 76
LOCATION:
   MI  ID
ABSTRACT:
    PROBLEM:  PREVIOUS DATA INDICATE THAT SURFACE MULCHES
      PROVIDE FAVORABLE ENVIRONMENTAL CONDITIONS FOR THE
      ESTABLISHMENT OF A PLANT COVER ON SURFACE MINE OVER-
      BURDEN MATERIALS.  MANY TYPES OF MULCH AND THEIR
      APPLICATION ARE PROHIBITIVELY EXPENSIVE FOR TREATING
      LARGE AREAS.  HYDRO-APPLICATIONS OF MULCH OFFERS AN
      ALTERNATIVE METHOD THAT WOULD BE ECONOMICAL.
    OBJECTIVES:  THE OBJECTIVES ARE:
      1. TO TEST THE EFFECTIVENESS OF WOOD FIBER AS A MULCH
      FOR THE ESTABLISHMENT OF GRASS SEEDLINGS.
      2. TO DETERMINE SUITABLE METHODS OF APPLICATION.
    METHODS:  A 500-GALLON BOWIE HYDROMULCHING UNIT WAS USED
      FOR APPLICATION OF SEED, FERTILIZER, AND WOOD-FIBER
      MULCH TO VARIOUS SURFACE MINE OVERBURDEN MATERIALS.  IN
      ADDITION, SEED WAS ALSO APPLIED WITH A STANDARD SEED-
      PACKER PRIOR TO HYDROMULCHING AND FERTILIZATION.
    RESULTS:  COMPARISONS OF DRY-MATTER PRODUCTION AMONG THE
      VARIOUS METHODS OF MULCH, SEED, AND FERTILIZER
      APPLICATIONS WILL BE MADE.


0000051
PROJECT TITLE:
     USE OF ORGANIC SOIL AMENDMENTS IN THE
     REVEGETATION OF SURFACE MINES.
   COMMODITIES:  COAL, COBALT, COPPER, GOLD
PROJECT NUMBER:
     SURFACE ENVIRONMENT AND MINING: INT-SIH-7
INVESTIGATORS:
   BLAND Z. RICHARDSON; RAY BROWN; EUGENE E. FARMER
```

PAUL PACKER
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321

COOPERATOR/COORDINATOR:
HANNA MINING CO.
SALMON NATIONAL FOREST
CUSTER NATIONAL FOREST
DECKER COAL CO.

PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468

PRIMARY FUNDING AMOUNT:
4000 PER YEAR

TIME FRAME:
07 01 73 TO 07 01 76

LOCATION:
MT ID

ABSTRACT:

PROBLEM: VIRTUALLY ALL OVERBURDEN PILES IN THE WEST CONTAIN LITTLE OR NO ORGANIC MATTER AND MICRO-ORGANISMS. THESE SOILS OFTEN PUDDLE AND COMPACT RESULTING IN EXCESSIVE SOIL BULK DENSITIES, LOW INFILTRATION, AND HIGH SURFACE RUNOFF RATES. IT HAS BEEN DEMONSTRATED THAT SOIL MICRO-ORGANISMS PLAY A VITAL ROLE IN THE PHYSIOLOGICAL PROCESSES OF PLANT GROWTH.

OBJECTIVES: THE OBJECTIVES ARE:

1. TO DETERMINE THE INFLUENCE OF VARIOUS ORGANIC SOIL AMENDMENTS IN THE PHYSIOLOGICAL RESPONSES OF PLANTS.
2. TO DETERMINE THE INFLUENCE OF ORGANIC SOIL AMENDMENTS ON THE PHYSICAL-AND-CHEMICAL PROPERTIES OF OVERBURDEN MATERIALS.

METHODS: THE VARIOUS ORGANIC SOIL AMENDMENTS THAT WILL BE APPLIED IN RESEARCH PLOTS INCLUDE (1) ANIMAL MANURE, (2) ACTIVATED SEWAGE SLEDGE, (3) HAY AND STRAW, AND (4) WOOD SHAVINGS. THESE AMENDMENTS WILL BE TILLED INTO THE SOIL AND SELECTED GRASS SEED MIXTURES WILL BE APPLIED.

RESULTS: DENSITY AND DRY-MATTER PRODUCTION OF PLANT COVER WILL BE EVALUATED IN THE VARIOUS TREATED PLOTS. THE INFLUENCE OF THESE TREATMENTS ON THE CHEMICAL AND PHYSICAL PROPERTIES OF SOILS WILL BE DETERMINED USING STANDARD TESTING PROCEDURES.

00000052

PROJECT TITLE:
RECLAMATION OF STRIP-MINED LAND AS AFFECTED BY DEPTH OF SURFACE SOIL AND SUBSOIL RETURNED
COMMODITY: LIGNITE

PROJECT NUMBER:
M-74-7

INVESTIGATORS:
F. M. SANDOVAL; W. O. WILLIS; J. J. BOND; R. E. RIES

PROJECT SUPERVISOR:
J. F. POWER
AGRICULTURAL RESEARCH SERVICE
NORTHERN GREAT PLAINS RESEARCH CENTER
P.O. BOX 459
MANDAN, ND 58544

COOPERATOR/COORDINATOR:
CONSOLIDATION COAL CO.; NORTH AMERICAN COAL CO.

PRIMARY SPONSOR:
AGRICULTURAL RESEARCH SERVICE

SECONDARY SPONSORS:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468

PRIMARY FUNDING AMOUNT:
FY 74 30,000
1975 - 40,000 C 25,000 ANNUALLY THEREAFTER

SECONDARY FUNDING AMOUNTS:
FY 74 30,000

TIME FRAME:
06 01 74 TO INDEFINITE

LOCATION:
ND

ABSTRACT:

PROBLEM: ATTEMPTS TO ALTER PROPERTIES OF SPOILS TO DATE HAVE FAILED TO RESTORE FULL PRODUCTIVITY, SO ATTEMPTS AT ACHIEVING THIS GOAL NEED TO BE MADE BY BURYING SPOILS UNDER SURFACE SOIL OR OTHER SUITABLE MATERIAL.

OBJECTIVES: TO DETERMINE THE DEPTH AND METHOD OF APPLICATION OF SURFACE SOIL REQUIRED TO RESTORE VARIOUS LEVELS OF PRODUCTIVITY TO SPOILS POSSESSING DIFFERENT PROPERTIES.

METHODS: REPLICATED FIELD EXPERIMENTS ARE BEING ESTABLISHED AT TWO MINE SITES - ONE HIGH AND ONE MODERATELY LOW IN ADSORBED SODIUM. TREATMENTS CONSIST OF FACTORIAL COMBINATIONS OF SPREADING FROM 0 TO 6 FEET OF SUBSOIL MATERIAL AND EITHER 0, 8, OR 24 INCHES OF TOPSOIL, SEGREGATED OR MIXED WITH THE SUBSOIL, OVER THE SURFACE OF THE SPOILS. AREA WILL THEN BE SEEDED TO SPRING WHEAT, CRESTED WHEATGRASS, 'NATIVE' GRASS MIXTURE, AND ALFALFA, AND THE EFFECTS OF THE TREATMENT ON PLANT GROWTH, WATER USE, AND SOIL PROPERTIES WILL BE EVALUATED.

00000053

PROJECT TITLE:
CHARACTERIZATION OF PHYSICAL AND CHEMICAL PROPERTIES OF SPOILS.

PROJECT NUMBER:
M-74-7-1

INVESTIGATORS:
F. M. SANDOVAL; R. E. RIES; AND W. O. WILLIS
PROJECT SUPERVISOR:
J. F. POWER
NORTHERN GREAT PLAINS RESEARCH CTR.
P. O. BOX 459
MANDAN, ND 58554
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
FY 74 - 100,000 ; FY 75 - 90,000
TIME FRAME:
05 01 74 TO INDEFINITE
LOCATION:
ND SD MT WY ID UT CO NM AZ
ABSTRACT:

PROBLEM: KNOWLEDGE OF THE NATURE OF AND VARIABILITY IN THE NATURE OF PROPERTIES OF OVERBURDEN MATERIALS IN THE NORTHERN GREAT PLAINS IS EXTREMELY LIMITED AND RESTRICTS RECLAMATION.

OBJECTIVES: TO CHARACTERIZE THOSE PHYSICAL AND CHEMICAL PROPERTIES OF OVERBURDEN MATERIALS THAT HAVE MAJOR EFFECTS UPON RECLAMATION, BOTH IN RESPECT TO AREAL DISTRIBUTION AND DEPTH.

METHODS: SAMPLES OF OVERBURDEN MATERIALS ARE COLLECTED FROM MAJOR MINING AREAS AND FROM AREAS IN WHICH COAL EXPLORATION IS TAKING PLACE THROUGHOUT THE NORTHERN GREAT PLAINS. THESE SAMPLES WILL BE IDENTIFIED AS TO ORIGINAL DEPTH AND GEOLOGICAL STRATA WHERE POSSIBLE, AND WILL BE ANALYZED FOR CHEMICAL AND PHYSICAL PROPERTIES OF PRIME CONCERN.

STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE AND REGRESSIONS ANALYSIS, WHERE APPROPRIATE.

00000054
PROJECT TITLE:
PRELIMINARY EVALUATION OF STRIP-MINE SPOILS AND METHODS FOR THEIR REVEGETATION.
COMMODITY: COAL
PROJECT NUMBER:
1970 EXPLORATORY
INVESTIGATORS:
F. M. SANDOVAL; J. F. POWER; W. O. WILLIS
PROJECT SUPERVISOR:
J. J. BOND
NORTHERN GREAT PLAINS RESEARCH CENTER
P. O. BOX 459
MANDAN, ND 58554
COOPERATOR/COORDINATOR:
SOIL CONSERVATION SERVICE
CONSOLIDATION COAL CO.
PRIMARY SPONSOR:
U.S. AG. RESEARCH SERVICE, NORTHERN GREAT PLAINS RESEARCH CTR.
PRIMARY FUNDING AMOUNT:
20000 ANNUALLY
TIME FRAME:
01 01 70 TO INDEFINITE
LOCATION:
ND WY MT
ABSTRACT:

PROBLEM: IN 1970 INFORMATION WAS LACKING REGARDING THE CHEMICAL AND PHYSICAL PROPERTIES OF STRIP-MINE SPOILS AND ON THE REVEGETATION POTENTIAL OF THESE MATERIALS.

OBJECTIVES: TO OBTAIN PRELIMINARY INFORMATION ON THE PHYSICAL AND CHEMICAL NATURES OF SPOILS AND HOW THESE PROPERTIES ARE RELATED TO PLANT GROWTH.

METHODS:
1. SPOIL SAMPLES WERE COLLECTED FROM MAJOR MINE SITES IN NORTH DAKOTA, MONTANA, AND WYOMING, AND ANALYZED FOR A NUMBER OF PROPERTIES.
2. OVERBURDEN MATERIALS WERE COLLECTED FROM SEVERAL DEPTHS AT ONE MINE SITE AND USED IN GROWTH CHAMBER STUDIES IN WHICH THE EFFECTS OF 45 TREATMENTS OR COMBINATIONS THEREOF UPON PLANT GROWTH WERE DETERMINED.
3. NONREPLICATED FIELD PLOTS WERE ESTABLISHED TO OBTAIN A PRELIMINARY EVALUATION OF THE EFFECTS OF SEVERAL TREATMENTS AND AMENDMENTS ON SPOIL PROPERTIES AND PLANT GROWTH.

STATISTICAL ANALYSIS: CORRELATION AND REGRESSION AND ANALYSIS OF VARIANCE.

SUMMARY: RESULTS INDICATED THAT MANY SPOILS ARE HIGH IN ADSORBED SODIUM, MODERATELY SALINE, LOW IN PLANT AVAILABLE P, AND VARIABLE IN AVAILABLE N CONTENT. STRAW AND ESPECIALLY A 2-INCH TOPSOIL MULCH AIDS IN INCREASING INFILTRATION AND PLANT ESTABLISHMENT, BUT WILL NOT SOLVE PROBLEMS ASSOCIATED WITH HIGHLY SODIC SPOILS. LIKEWISE, GYPSUM OR SULFURS WILL REDUCE SAR VALUES SOMEWHAT AFTER SEVERAL YEARS. MINOR ELEMENT DEFICIENCIES OR TOXICITIES APPEAR TO PRESENT LITTLE PROBLEM IN REVEGETATION.

REPORTS AND PUBLICATIONS:
1. PROGRESS REPORT OF RE-VEGETATION STUDIES OF COAL MINE SPOILS OF NORTH DAKOTA.
2. LIGNITE SPOILS IN THE NORTHERN GREAT PLAINS--CHARACTERISTICS AND POTENTIAL FOR RECLAMATION.
3. IN SOME ENVIRONMENTAL ASPECTS OF STRIP-MINING IN NORTH DAKOTA.
4. NITRIFICATION IN PALEOCENE SHALES.
NO FINAL REPORT AS SUCH ANTICIPATED.

00000055
PROJECT TITLE:
THE EFFECTS OF VARIOUS DEPTHS OF TOPSOIL ADDED TO SODIC COAL MINE SPOILS ON GRASS ESTABLISHMENT AND GROWTH
PROJECT NUMBER:
M-72-1
INVESTIGATORS:
F. M. SANDOVAL; J. F. POWER; W. O. WILLIS
PROJECT SUPERVISOR:
J. J. BOND
NORTHERN GREAT PLAINS RESEARCH CENTER
P. O. BOX 459
MANDAN, ND 58554
COOPERATOR/COORDINATOR:
CONSOLIDATION COAL CO.
PRIMARY SPONSOR:
U.S. AG. RESEARCH SERVICE, NORTHERN GREAT PLAINS RESEARCH CTTR.
PRIMARY FUNDING AMOUNT:
1972 - 20,000 ; 10,000 THEREAFTER
TIME FRAME:
01 01 72 TO INDEFINITE
LOCATION:
ND
ABSTRACT:

PROBLEM: PRELIMINARY WORK INDICATED THAT 2 INCHES OF TOPSOIL WAS BENEFICIAL IN RECLAMATION, RAISING THE QUESTION ON THE EFFECTS OF GREATER QUANTITIES OF TOPSOIL.

OBJECTIVES: TO DETERMINE THE EFFECTS OF UP TO 12 INCHES OF TOPSOIL, IN COMBINATION WITH VARIOUS N AND P FERTILIZER TREATMENTS, UPON THE SURVIVAL AND PRODUCTION OF CRESTED WHEATGRASS AND A ¤NATIVE GRASS¤ MIXTURE.

METHODS: A REPLICATED FIELD EXPERIMENT WAS ESTABLISHED IN WHICH A FACTORIAL ARRANGEMENT OF FOUR DEPTHS OF TOPSOIL, TWO N AND P RATES, AND TWO PERENNIAL GRASSES (CRESTED WHEATGRASS AND A NATIVE MIXTURE) WERE STUDIED IN RESPECT TO PLANT GROWTH, WATER USE, AND CHANGES IN PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE SPOIL MATERIALS.

STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE.

SUMMARY: PLOTS SEEDED IN 1973, WITH NO STAND ESTABLISHMENT WITH NO TOPSOIL, GOOD STANDS ON ALL TOPSOIL PLOTS. RESPONSES TO FERTILIZER WITH 2 INCHES OF TOPSOIL; MUCH MORE VIGOROUS GROWTH OF CRESTED WHEATGRASS THAN OF THE NATIVE MIXTURE OF ADAPTED GRASS SPECIES.

00000056
PROJECT TITLE:
UTILIZATION OF AMENDMENTS, TOPSOIL, AND MULCHES TO IMPROVE SODIC SPOIL MATERIALS.
COMMODITY: LIGNITE
PROJECT NUMBER:
M-72-2
INVESTIGATORS:
J. J. BOND; F. M. SANDOVAL; W. O. WILLIS
PROJECT SUPERVISOR:
J. F. POWER
NORTHERN GREAT PLAINS RESEARCH CENTER
P. O. BOX 459
MANDAN, ND 58554
COOPERATOR/COORDINATOR:
CONSOLIDATION COAL CO.
PRIMARY SPONSOR:
U.S. AG. RESEARCH SERVICE, NORTHERN GREAT PLAINS RESEARCH CTR
PRIMARY FUNDING AMOUNT:
1972 - 15,000 ; 5000 ANNUALLY THEREAFTER
TIME FRAME:
01 01 72 TO INDEFINITE
LOCATION:
ND
ABSTRACT:

PROBLEM: PRELIMINARY GROWTH CHAMBER DATA INDICATED THAT CERTAIN COMBINATIONS OF TREATMENTS HAD MERIT FOR RECLAMATION, SO THEY WERE TRIED UNDER FIELD CONDITIONS.

OBJECTIVES: TO EVALUATE THE EFFECTS OF COMBINATIONS OF AMENDMENTS, TOPSOIL, AND FERTILIZERS ON PLANT GROWTH AND CHANGES IN SPOIL PROPERTIES.

METHOD: A REPLICATED FIELD EXPERIMENT WAS ESTABLISHED IN WHICH FACTORIAL COMBINATIONS WITH AND WITHOUT 2 INCHES TOPSOIL, GYPSUM, FIVE RATES OF N AND P AND TWO PLANT SPECIES (BARLEY AND CRESTED WHEATGRASS) WERE STUDIED. PLOTS WERE IRRIGATED IN 1972 ONLY, AND MEASUREMENTS MADE OF DRY WEIGHT, WATER CONTENT IN THE ROOT ZONE, AND CHANGES IN PROPERTIES OF SPOILS.

STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE.

SUMMARY: ON MODERATELY SODIC SPOILS (SAR ABOUT 12) TOPSOIL AND GYPSUM HAD NO APPRECIABLE EFFECT UPON PLANT GROWTH. P FERTILIZATIONS (BUT NOT N FERTILIZATION) GREATLY ENHANCED PLANT GROWTH. MAXIMUM DRY MATTER PRODUCTION BY BARLEY WITH THE BEST COMBINATIONS OF TREATMENTS KNOWN WAS ONLY ABOUT 25% OF THAT WHICH WOULD BE EXPECTED FROM CLASS II SOILS, 50% OF THAT EXPECTED FROM CLASS IV SOIL, AND 75 TO 100% OF THAT EXPECTED FROM CLASS VI SOIL.

REPORTS AND PUBLICATIONS:
1. LIGNITE SPOILS IN THE NORTHERN GREAT PLAINS--CHARACTERISTICS AND POTENTIAL FOR RECLAMATION.

2. IN SOME ENVIRONMENTAL ASPECTS OF STRIP-MINING IN NORTH DAKOTA.
3. CAN PRODUCTIVITY OF MINED LAND BE RESTORED IN WESTERN NORTH DAKOTA?

00000057

PROJECT TITLE:
EFFECT OF NITROGEN, PHOSPHORUS, AND VEGETATIVE MULCH ON GRASS ESTABLISHMENT.

PROJECT NUMBER:
M-72-3

INVESTIGATORS:
J. J. BOND; F. M. SANDOVAL; W. O. WILLIS

PROJECT SUPERVISOR:
J. F. POWER
NORTHERN GREAT PLAINS RESEARCH CENTER
P. O. BOX 459
MANDAN, ND 58554

COOPERATOR/COORDINATOR:
CONSOLIDATION COAL CO.

PRIMARY SPONSOR:
U.S. AG. RESEARCH SERVICE, NORTHERN GREAT PLAINS RESEARCH CTR

PRIMARY FUNDING AMOUNT:
1972 AND 1973 - 10,000 ; 5000 ANNUALLY THEREAFTER

TIME FRAME:
01 01 72 TO INDEFINITE

LOCATION:
ND

ABSTRACT:

PROBLEM: SINCE VEGETATIVE MULCHES APPEARED TO HAVE A POTENTIAL USE IN RECLAMATION, FURTHER STUDIES WERE NEEDED TO DETERMINE THEIR EFFECTS.

OBJECTIVES: TO DETERMINE HOW VEGETATIVE MULCHES COULD BE BEST AND MOST ECONOMICALLY APPLIED AND HOW THEY AFFECT N AND P REQUIREMENTS.

METHODS: A REPLICATED FIELD EXPERIMENT WAS ESTABLISHED WHICH INCLUDED FACTORIAL COMBINATIONS OF THREE MULCH TREATMENTS (NONE, MECHANICAL SPREADING, AND SEEDING GRASS INTO STANDING BARLEY STUBBLE), FIVE P RATES (TO 200 LB/ACRE), ADD 0 TO 50 LB N/ACRE ANNUALLY. BARLEY STUBBLE WAS PRODUCED IN 1972, OTHER TREATMENTS APPLIED AND CRESTED WHEATGRASS SEEDED IN 1973.

STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE.

SUMMARY: ON THESE HIGHLY SODIC SPOILS, 1972 BARLEY PRODUCTION WAS VERY POOR, SO STUBBLE CONSISTED OF BOTH BARLEY AND KOCHIA. 1973 GRASS SEEDING WAS ESSENTIALLY A FAILURE ON ALL BUT PLOTS ON WHICH STRAW WAS SPREAD MECHANICALLY. PLOTS RESEEDED IN 1974.

00000058

PROJECT TITLE:
SPOIL MATERIALS IN RELATION TO THEIR ORIGINAL DEPTH AS A MEDIUM FOR GRASS GROWTH.

PROJECT NUMBER:
M-72-4

INVESTIGATORS:
J. J. BOND; W. O. WILLIS; J. F. POWER

PROJECT SUPERVISOR:
F. M. SANDOVAL
NORTHERN GREAT PLAINS RESEARCH CENTER
P. O. BOX 459
MANDAN, ND 58554

COOPERATOR/COORDINATOR:
CONSOLIDATION COAL CO.

PRIMARY SPONSOR:
U.S. AG. RESEARCH SERVICE, NORTHERN GREAT PLAINS RESEARCH CTR.

PRIMARY FUNDING AMOUNT:
1973 - 15,000 ; 10,000 THEREAFTER

TIME FRAME:
01 01 73 TO INDEFINITE

LOCATION:
ND

ABSTRACT:

PROBLEM: IF SPOILS ARE COVERED WITH SOIL OR OTHER SUITABLE MATERIALS, ADDITIONAL STUDIES ARE REQUIRED TO DETERMINE GROWTH POTENTIAL OF THESE MATERIALS.

OBJECTIVE: TO EVALUATE PLANT GROWTH POTENTIAL OF OVERBURDEN MATERIALS FROM SEVERAL ZONES ABOVE COAL SURFACE ENVIRO
THE PROPERTIES OF THESE MATERIALS WHEN SPREAD ON THE SURFACE OF SPOILS.

METHODS: A REPLICATED FIELD EXPERIMENT WAS ESTABLISHED IN WHICH FIVE OVERBURDEN MATERIALS FROM DIFFERENT ZONES (SURFACE 2 FEET, SUBSOIL, ZONE OF MAXIMUM SALT ACCUMULATION, MIXTURE OF THESE THREE ZONES, AND MATERIALS IMMEDIATELY ABOVE COAL SURFACE ENVIRONMENT AND MINI
FOOT DEEP OVER SPOILS AND EITHER SEEDED IMMEDIATELY OR AFTER TWO YEARS OF FALLOW TO A 'NATIVE' GRASS MIXTURE.

STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE.

SUMMARY: INITIAL SEEDING MADE IN 1974, NO DATA YET AVAILABLE.

00000059

PROJECT TITLE:
HYDROLOGIC CHARACTERISTICS OF MINE SPOILS

PROJECT NUMBER:
10570165

PROJECT SUPERVISOR:
WAYNE A. VAN VOAST, HYDROLOGIST
MONTANA BUREAU OF MINES AND GEOLOGY

BUTTE, MT 59701
PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
WILLIAM FOGARTY
PRATT BUILDING, SUITE 306A
BILLINGS, MT 59101
PRIMARY FUNDING AMOUNT:
97,400
TIME FRAME:
06 16 75 TO 06 30 77
LOCATION:
MT
ABSTRACT:

OBJECTIVES: (1) GATHER ADEQUATE DATA ON WATER FLOW AND WATER CHEMISTRY OF SELECTED MINE SPOILS; (2) FROM THIS DATA DEVELOP RELIABLE MODELS TO SIMULATE PRE-MINING SYSTEMS FOR FLOW QUANTITY AND QUALITY; AND (3) USE THESE MODELS TO EVALUATE ALTERNATE MINING AND RECLAMATION TECHNIQUES. APPROACH: SPOILS - WATER FLOW RATES. PERMEABILITY DATA WILL BE OBTAINED BY INSTALLING AND TESTING WELLS IN MINE SPOILS IN THE COLSTRIP AREA. COMPARISONS WITH PRE-MINING PREMEABILITIES AND FLOW RATES FOR THE AREAS PREVIOUSLY DETERMINED WILL ENABLE CALCULATIONS OF POST-MINING FLOW RATES TO BE MADE. COMPARISONS WITH AVAILABLE DATA AND PROJECTIONS TO UNMINED AREAS WILL ENABLE PREDICTIONS OF FLOW RATES TO BE MADE AFTER MINING. SPOILS - WATER CHEMISTRY. WATER SAMPLES COLLECTED FROM RESEARCH WELLS, PONDS, AND SEEPS WILL BE ANALYZED FOR CONCENTRATIONS OF MAJOR CHEMICAL CONSTITUENTS, TRACE METALS, AND DISSOLVED ORGANIC COMPOUNDS. FIELD WATERS WILL BE CHEMICALLY SIMULATED IN LABORATORY LEACH TESTS WITH SPOILS AND OVERBURDEN SAMPLES AND APPLIED TO OVERBURDEN SAMPLES FROM UNMINED AREAS FOR PREDICTIONS OF FUTURE SPOILS-WATER QUALITY. THIS WORK WILL RELY HEAVILY ON ALREADY COMPLETED PRELIMINARY RESEARCH. THE WATER CHEMISTRY RESEARCH WILL ALSO INCLUDE EXAMINATION OF A PARAMETER NOT YET STUDIED FOR ANY MINE WATERS: THE DETERMINATION OF ORGANIC COMPOUNDS DISSOLVED FROM COAL AND THEIR ROLES IN CHELATION AND MOBILIZATION OF TRACE METALS IN MINE WATERS. MAJOR CHEMICAL ANALYSES WILL INCLUDE: CALCIUM, MAGNESIUM, SODIUM, SULFATES, BICARBONATES AND CHLORIDES. TRACE METAL ANALYSIS WILL INCLUDE: LEAD, ZINC, CHROMIUM, COPPER, ARSENIC AND SELENIUM. ORGANIC COMPOUNDS WILL INCLUDE THE HUMIC ACIDS. WATER FLOW AND WATER QUALITY MODELS. MODELS TO SIMULATE GROUNDWATER CONDITIONS IN PRE-MINING AND POST-MINING SYSTEMS WILL BE DEVELOPED UTILIZING THE RESULTS OF THE LABORATORY AND FIELD INVESTIGATIONS. THE MODEL OUTPUT WILL SIMULATE AND PREDICT FLOW QUANTITY AND QUALITY SO THAT ALTERNATIVE MINING AND RECLAMATION TECHNIQUES MAY BE RELIABLY EVALUATED.

00000060
PROJECT TITLE:
CHARACTERISTICS OF SURFACE & ROOT ZONE HYDROLOGY OF SHAPED SPOIL MATERIALS
PROJECT NUMBER:
NDSFD-MLFG-NDAES-0002
INVESTIGATORS:
GLENDON GEE
JOHN GILLEY
PROJECT SUPERVISOR:
ARMAND BAUER
NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION
NORTH DAKOTA STATE UNIVERSITY
FARGO, ND 58102
701-237-8901
COOPERATOR/COORDINATOR:
AG. RESEARCH SERVICE, NORTHERN GRT. PLAINS RESEARCH CENTER
J. F. POWER
P.O. BOX 459
MANDAN, ND 58554
701-663-6448
PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
WILLIAM FOGARTY
PRATT BUILDING, SUITE 306A
BILLINGS, MT 59101
406-245-6711 X6665
PRIMARY FUNDING AMOUNT:
138,767
TIME FRAME:
07 18 74 TO 06 30 76
LOCATION:
ND
ABSTRACT:

PURPOSE: APPLICATION OF A SUFFICIENT AMOUNT OF GOOD QUALITY TOPSOIL MATERIAL MAY BE EXPECTED TO GREATLY IMPROVE WATER INTAKE CHARACTERISTICS OF MINED LAND, BUT THE SHAPED SPOIL UNDERLYING THE TOPSOIL MUST ALSO PERMIT READY MOVEMENT OF WATER IN ORDER TO AVOID TOPSOIL LOSSES WITH HEAVY RAINFALL. WATER PROBLEMS WILL BE STUDIED BY THE MEASUREMENT OF PRECIPITATION, RUNOFF, EROSION SUSCEPTIBILITY, AND WATER INTAKE AND MOVEMENT WITHIN AND THROUGH THE ROOT ZONE AND THE AREA IMMEDIATELY BENEATH THE ROOT ZONE. PROCEDURES: A. DEVELOPMENT OF WATERSHEDS AND INSTALLATION OF INSTRUMENTATION. 1. VARIABLES: A. VEGETATION AND NO VEGETATION; B. SLOPE DEGREE (NEAR LEVEL TO 9 PER CENT); C. SLOPE LENGTH (LESS THAN 100 FEET UP TO 300 FEET); D. TOPSOIL DEPTH (NONE TO THREE FEET); E. CONCAVE AND CONVEX SLOPE CONFIGURATION. 2. MEASUREMENTS: A. WATER INTAKE (STORM AND SEASONAL BASIS); B. SEDIMENT COLLECTION AND ANALYSIS. B. COMPANION PLOT STUDIES (PURDUE RAINULATOR) TO EVALUATE EROSION AND RUNOFF

SUSCEPTIBILITY: 1. VARIABLES: A. DEGREE OF SOIL COVER (AS ABOVE); B. SOIL SURFACE PROPERTIES; C. SLOPE CHARACTERISTICS (AS ABOVE); D. INTENSITY AND DURATION OF RAINFALL; E. SOIL PROFILE PROPERTIES. 2. MEASUREMENTS (AS ABOVE).

TYPE OF STUDY:

PART OF 'NORTH DAKOTA RECLAMATION STUDY,' OLD WEST REGIONAL COMMISSION

00000061

PROJECT TITLE:

DETERMINATION OF THE CHEMICAL AND PHYSICAL CHARACTERISTICS OF SHAPED MINED LANDS & THEIR EFFECT ON PERFORMANCE OF ESTABLISHMENT OF PLANTS

PROJECT NUMBER:

NDSPD-MLPG-NDAES-0001

INVESTIGATORS:

GLENDON GEE; JOHN GILLEY

PROJECT SUPERVISOR:

ARMAND BAUER
NORTH DAKOTA AG. EXP. STATION
NORTH DAKOTA STATE UNIVERSITY
FARGO, ND 58102
701-237-8901

COOPERATOR/COORDINATOR:

AG. RESEARCH SERVICE, NORTHERN GRT. PLAINS RESEARCH CENTER
J. F. POWER
P.O. BOX 459
MANDAN, ND 58554
701-663-6448

PRIMARY SPONSOR:

OLD WEST REGIONAL COMMISSION
WILLIAM FOGARTY
PRATT BUILDING, SUITE 306A
BILLINGS, MT 59101
405-245-6711

PRIMARY FUNDING AMOUNT:

73,367.00

TIME FRAME:

07 18 74 TO 06 30 76

LOCATION:

ND

ABSTRACT:

PURPOSE: TO IDENTIFY THE MAGNITUDE AND INFLUENCE OF CHEMICAL AND PHYSICAL CONDITIONS IN MINE SPOIL THAT CONTRIBUTE TO VARIABLE PLANT PERFORMANCE. PROCEDURES: A. SAMPLING OF OVERBURDEN FOR PHYSICAL AND CHEMICAL STUDIES 1. PHYSICAL MEASUREMENTS A. TEXTURE; B) BULK DENSITY; C) AGGREGATE STAPILITY; D) WATER INTAKE RATES VIA PURDUE RAINULATOR. 2. CHEMICAL MEASUREMENTS A) EXCHANGEABLE SODIUM, CALCIUM, MAGNESIUM, TOTAL EXCHANGE CAPACITY; B) TOTAL SOLUBLE SALTS; C) IONIC COMPOSITION OF THE SOLUBLE SALTS; D) CALCIUM CARBONATE EQUIVALENT; E) PH. B. CORRELATION OF OVERBURDEN PROPERTIES WITH PHYSICAL AND CHEMICAL CHARACTERISTICS OF SHAPED SPOILS. C. CORRELATION OF PLANT PERFORMANCE WITH PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE RE-CREATED SOIL PROFILE.

TYPE OF STUDY:

PART OF 'NORTH DAKOTA RECLAMATION STUDY,' OLD WEST REGIONAL COMMISSION

00000062

PROJECT TITLE:

PLANT ESTABLISHMENT AND CULTURE ON SURFACE-MINED LANDS

PROJECT NUMBER:

NDSPD-MLPG-NDAES-0003

INVESTIGATORS:

GLENDON GEE; JOHN GILLEY

PROJECT SUPERVISOR:

ARMAND BAUER
NORTH DAKOTA STATE UNIVERSITY, AG. EXP. STATION
FARGO, ND 58102
701-237-8901

COOPERATOR/COORDINATOR:

AG. RESEARCH SERVICE, NORTHERN GRT. PLAINS RESEARCH CENTER
J. F. POWER
P. O. BOX 459
MANDAN, ND 58554
701-663-6448

PRIMARY SPONSOR:

OLD WEST REGIONAL COMMISSION
WILLIAM FOGARTY
PRATT BUILDING, SUITE 306A
BILLINGS, MT 59101
406-245-6711 X6665

PRIMARY FUNDING AMOUNT:

105,968

TIME FRAME:

07 18 74 TO 06 30 76

LOCATION:

ND

ABSTRACT:

PURPOSE: SURFACE MINING MUST BE CONSIDERED A DRASTIC DISRUPTION OF THE SOIL-PLANT CONTINUUM, THE LONG-RANGE EFFECTS OF WHICH NEED TO BE MINIMIZED AS MUCH AS POSSIBLE IN ORDER TO MAINTAIN ACCEPTABLE LEVELS OF AGRICULTURAL PRODUCTION. THE DEGREE OF DISRUPTION, IN TERMS OF AFFECTING MANAGEMENT TECHNIQUES AND ECONOMICALLY IMPORTANT CROP AND RANGE PLANTS, MUST BE MEASURED IN ORDER TO DEVISE SUITABLE AGRONOMIC AND MANAGEMENT STRATEGIES.

SELECTION AND DEVELOPMENT OF ALTERNATIVE SOIL PROFILES

B. SELECTION OF PLANT MATERIALS: 1. INTRODUCED CROP SPECIES; 2. INTRODUCED FORAGES A) LEGUMES B) GRASSES 3. NATIVE GRASSES AND OTHER SPECIES

TECHNIQUES TO EVALUATE NATIVE AND INTRODUCED PLANT SPECIES AS TO: 1. METHODS OF ESTABLISHMENT; 2. WATER AND FER-

TILIZER NEEDS; 3. ADAPTABILITY OF PLANT SPECIES; 4. LEVELS OF MANAGEMENT NEEDED TO PERPETUATE SEEDED PLANT COMMUNITIES.
TYPE OF STUDY:
PART OF "NORTH DAKOTA RECLAMATION STUDY," OLD WEST REGIONAL COMMISSION

00000063
PROJECT TITLE:
PROGRAM TO EVALUATE SURFACE AND GROUND WATER ASSOCIATED WITH POTENTIAL STRIP MINE SITES - CHARACTERIZATION OF OVERBURDEN
INVESTIGATORS:
PAUL C. SINGLETON; HUGH HOUGH
PROJECT SUPERVISOR:
PAUL A. RECHARD
UNIV. OF WYOMING, WATER RESOURCES RESEARCH INST.
LARAMIE, WY 82070
307-766-2143
COOPERATOR/COORDINATOR:
MONTANA STATE UNIVERSITY
BOZEMAN, MT 59715
PRIMARY SPONSOR:
ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460
SECONDARY SPONSORS:
UNIV. OF WYOMING, AG. EXP. STATION
LARAMIE, WY 82070
PRIMARY FUNDING AMOUNT:
27,869
SECONDARY FUNDING AMOUNTS:
4,134
TIME FRAME:
07 01 75 TO 06 30 76
LOCATION:
WY
ABSTRACT:
AN EFFORT WILL BE MADE TO CHARACTERIZE THE OVERBURDEN FROM A PHYSICAL AND CHEMICAL POINT OF VIEW AS WELL AS DETERMINE ITS RELATIONSHIP TO THE WATER COMING TO ITS SURFACE. INTERACTIONS OF SOIL AND WATER WILL BE OF ULTIMATE IMPORTANCE IN REHABILITATING MINE SPOIL. OVERBURDEN CHARACTERIZATION EFFORTS WILL BE CONDUCTED IN TWO PHASES AS FOLLOWS: I. PHYSICAL CHARACTERIZATION A. SAMPLES FROM EACH LAYER: 1. GRAIN SIZE ANALYSIS 2. BULK DENSITY, PARTICLE DENSITY, POROSITY, STANDARD SOIL MOISTURE INDEX VALUES. B. WATER STORAGE CHARACTERISTICS OF DISTURBED AND UNDISTURBED SAMPLES. C. HYDRAULIC CONDUCTIVITY. D. WATER FLOW CHARACTERISTICS IN FIELD. II. CHEMICAL CHARACTERIZATION: A. COLLECT SAMPLES FROM AVAILABLE OVERBURDEN CORES AND HAVE ADDITIONAL CORES DRILLED IF NEEDED. B. ARTIFICIAL WEATHERING TESTS. C. PROPERTIES OF SATURATION PASTES AND EXTRACTS. D. CATION EXCHANGE PROPERTIES. E. MINERALOGICAL PROPERTIES.

00000064
PROJECT TITLE:
ARID LAND STRIP MINE SPOIL BANK RECLAMATION
PROJECT NUMBER:
WYO. 69-72
INVESTIGATORS:
MORTON MAY; R. L. LANG
PROJECT SUPERVISOR:
MORTON MAY
UNIVERSITY OF WYOMING
P.O. BOX 3354, UNIVERSITY STATION
LARAMIE, WY 82071
307-766-5258
PRIMARY SPONSOR:
UNIVERSITY OF WYOMING, PLANT SCIENCES DIVISION
L. I. PAINTER
P.O. BOX 3354, UNIVERSITY STATION
LARAMIE, WY 82071
3-7-766-3103
SECONDARY SPONSORS:
CARTER MINING CO
MARK BOSSARD (GILLETTE, WY)
BOX 1244
HOUSTON, TX 77001
307-682-8881
BRIDGER COAL CO
BOX 2068
ROCK SPRINGS, WY 82901
307-382-9741
PRIMARY FUNDING AMOUNT:
FY 76 - 36,163
FY 76 - 31,037 CARTER OIL
FY 76 - 27,410 BRIDGER COAL
TIME FRAME:
07 01 71 TO 06 30 76
LOCATION:
WY
ABSTRACT:
MINING OF COAL BY THE STRIPPING OR OPEN PIT TECHNIQUE IS INCREASING RAPIDLY IN WYOMING. THE HUGE COAL RESERVES AND DEMAND FOR ENERGY HAS CONTRIBUTED TO INCREASED MINING ACTIVITY AS IT IS ESTIMATED THAT THERE ARE FROM 17 TO 19 BILLION TONS OF COAL IN WYOMING WITH 150 FEET OR LESS OVERBURDEN. RESEARCH PERTAINING TO RECLAMATION OF STRIP MINE OVERBURDEN WAS STARTED IN WYOMING IN 1964 AND IS BEING EXPANDED TO DEVELOP SOUND KNOWLEDGE SO THAT THE MINING COMPANIES MAY MEET THE STATE REQUIREMENTS FOR LAND RECLAMATION. THE BASIC OBJECTIVES OF THIS RESEARCH ARE: 1. TO DETERMINE OPTIMUM PROCEDURES FOR SHAPING OF STRIP MINE SPOIL MATERIAL. 2. TO DETERMINE PROPER REPLACEMENT OF OVERBURDEN MATERIAL WHICH

IS CHEMICALLY OR PHYSICALLY UNDESIRABLE. 3. TO STUDY BASIC SOIL-PLANT MOISTURE RELATIONSHIPS OF SPOIL MATERIALS AND MAINTENANCE OF COVER. 4. TO INVESTIGATE SPECIES ADAPTABILITY AND PROCEDURES FOR ESTABLISHMENT AND MAINTENANCE OF COVER. 5. TO RESEARCH METHODS OF MICROCLIMATE MODIFICATION FOR MAXIMUM ESTABLISHMENT AND PRODUCTION. THE MAJOR COAL PRODUCTION AREAS ARE IN THE SOUTH WESTERN AND NORTH EASTERN QUARTERS OF THE STATE. THE SOUTH WESTERN AREA IS IN THE NORTHERN DESERT SHRUB TYPE WITH LOW PRECIPITATION (9 TO 11 INCHES) WHILE THE NORTH EASTERN QUARTER OF THE STATE IS ON THE EDGE OF THE GREATER PLAINS AND HAS MORE FAVORABLE SOIL AND CLIMATIC CONDITIONS. IN ADDITION THE TOPSOIL OVERBURDEN MATERIAL IS VARIABLE BETWEEN MINING SITES IN BOTH VEGETATION REGIONS. THIS NECESSITATES THAT RESEARCH BE LOCALIZED TO ACCOUNT FOR THESE VARIABLES.

REPORTS AND PUBLICATIONS:

(1)H. BEAUCNAMP, R. LANG, ET AL. 'TOPSOIL AS A SEED SOURCE FOR RESEEDING STRIP MINE SPOIL.' JULY 1975, WYOMING AG. EXP. STATION RESEARCH JOURNAL 90. (2)R. L. LANG, F. RAUZI, ET AL. 'GUIDE LINES FOR SEEDING RANGE, PASTURE AND DISTURBED LANDS.' JULY, 1975. WYOMING AG. EXP. STATION BULLETIN NO. 261. (3)M. MAY, R. LAND, ET AL. 'RECLAMATION OF STRIP MINE SPOIL BANK IN WYOMING.' SEPTEMBER 1971. WYOMING AG. EXP. STATION RESEARCH JOURNAL 51. (4)G. H. BRIDGMON AND R. L. LANG. 'EFFECT OF SULFUR DIOXIDE ON DESERT PLANTS OF SOUTHERN WYOMING.' SPRING 1974. JOURNAL OF THE COLORADO-WYOMING ACADEMY OF SCIENCES, VOL. VII NO. 5, P. 41-42. (5)M. MAY.'MOISTURE RELATIONSHIPS AND TREATMENTS IN REVEGETATING STRIP MINES IN THE ARID WEST.' JOURNAL OF RANGE MANAGEMENT. IN PRESS.

00000065

PROJECT TITLE:
COAL OVERBURDEN CHARACTERIZATION AND REVEGETATION STUDIES

PROJECT NUMBER:
ND4519

INVESTIGATORS:
FRED W. SCHROER: WARREN C. WHITMAN
NORTH DAKOTA STATE UNIV., SOILS DEPT., BOTANY DEPT.
FARGO, ND 58102
701-237-8883

PROJECT SUPERVISOR:
A.G. HAZEN
NORTH DAKOTA STATE UNIV. AG. EXP. STATION
FARGO, ND 58102

PRIMARY SPONSOR:
U.S. AGRICULTURE RESEARCH SERVICE

PRIMARY FUNDING AMOUNT:
53,000
FY 75 - 30,337

TIME FRAME:
07 01 73 TO 06 30 76

LOCATION:
ND

ABSTRACT:
THE OBJECTIVES: 1. PHYSICAL AND CHEMICAL CHARACTERIZATION OF OVERBURDEN OVER COAL IN WESTERN NORTH DAKOTA. 2. EVALUATE INTERSPECIES COMPETITION AMONG NATIVE GRASSES AND FORBS ON RECLAIMED COAL MINE SPOIL. 3. COMPARE PRODUCTIVITY OF RECLAIMED SPOILS SEEDED TO NATIVE AND TAME GRASS MIXTURES WITH THAT OF UNDISTURBED NATIVE RNAGE. APPROACH: RE: OVERBURDEN CHARACTERIZATION. 1. CONCENTRATE ON ACTIVE MINING SITES AND PROPOSED SITES. 2. EMPHASIZE SAMPLING SOILS OF SIGNIFICANT AREA TO 5 FEET. 3. SUBSTANTIAL NUMBER OF SAMPLINGS TO COAL SEAM (UP TO 100 FEET). 4. DETERMINE USEABLE CHEMICAL AND PHYSICAL PARAMETERS. RE: VEGETATION STUDIES: 1. ESTABLISH STANDS OF NATIVE GRASSES AND FORBS ON RECLAIMED SPOIL BANK SITES FOR INTERSPECIES COMPETITION STUDIES. 2. COMPARE PRODUCTIVITY OF RECLAIMED SPOILS SEEDED TO NATIVE AND TAME GRASS MIXTURES WITH THAT OF NATIVE RANGE.

00000066

PROJECT TITLE:
ENERGY MINERALS REHABILITATION INVENTORY AND ANALYSIS: EMRIA

PROJECT SUPERVISOR:
RONALD KUHLMAN
U.S. BUREAU OF LAND MANAGEMENT
D-307, BLDG. 50, DENVER FED. CENTER
DENVER, CO 80225
303-234-2333

TIME FRAME:
09 01 74 TO INDEFINITE

LOCATION:
CO MT NM ND UT WY

1.2 RECLAMATION

ABSTRACT:

THE BUREAU OF LAND MANAGEMENT (BLM) HAS BEEN DESIGNATED TO ADMINISTER THE EMRIA PROGRAM WHICH IS A DEPARTMENT OF INTERIOR EFFORT. THE PURPOSE OF THE PROGRAM IS TO DETERMINE THE RECLAMATION POTENTIAL OF COAL LANDS AFFECTED BY COAL DEVELOPMENT. THIS IS ACCOMPLISHED BY CONTRACTING WITH THE BUREAU OF RECLAMATION TO DRILL A SERIES OF HOLES IN BLM SELECTED SITES AND TO COLLECT AND ANALYZE SAMPLES OF SOILS, OVERBURDEN, COAL,AND SUBSTRATA. VEGETATION IS ALSO IDENTIFIED.

IN ADDITION, CONTRACTS OR WORK ORDERS ARE EXECUTED WITH THE GEOLOGICAL SURVEY TO COLLECT AND ANALYZE WATER SAMPLES. IN SUMMATION, THE DRILLING AND STUDIES WILL BE AIMED AT SECURING THE CHEMICAL AND PHYSICAL DATA ON A PROFILE FROM THE SURFACE THROUGH THE STRIPPABLE COAL RESOURCES AND INTO THE UNDERLYING STRATA TO A DEPTH OF 25 FEET BELOW THE COAL.

INTERPRETATION OF THESE DATA WILL SERVE AS A BASIS FOR:

1. ASSESSING THE RECLAMATION POTENTIAL PRIOR TO LEASING.

2. THE PREPARATION OF SITE SPECIFIC STIPULATIONS FOR ENERGY EXPLORATION, MINING, AND RECLAMATION PLANS.

3. TO PROVIDE BASELINE DATA FOR SOILS, SURFACE WATER AND GROUNDWATER ON WHICH TO MONITOR CHANGES THAT MAY OCCUR ON THESE RESOURCES DURING AND AFTER STRIP-MINING OF COAL.

00000067

PROJECT TITLE:
OTTER CREEK RECLAMATION STUDY SITE

PROJECT NUMBER:
PH 5-201

INVESTIGATORS:
H. K. DUPREE
U.S. BUREAU OF RECLAMATION
BILLINGS, MT 59101

GEORGE PIKE
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
HELENA, MT 58601

ED LANDIS
U.S. GEOLOGICAL SURVEY
GEOLOGIC DIVISION
DENVER, CO 80225

PROJECT SUPERVISORS:
RONALD L. KUHLMAN
BUREAU OF LAND MANAGEMENT
D-307, BLDG. 50
DENVER FEDERAL CENTER
DENVER, CO 80225
303-234-2333

COOPERATOR:
U.S. BUREAU OF LAND MANAGEMENT

PRIMARY SPONSOR:
U.S. BUREAU OF LAND MANAGEMENT

PRIMARY FUNDING AMOUNT:
150,000 (ANNUAL MAINT. 4,000)

TIME FRAME:
07 01 74 TO 07 01 75

LOCATION:
MT

ABSTRACT:

PURPOSE: TO ESTABLISH BASELINE CONDITIONS ON SOIL, OVERBURDEN, COAL RESOURCE, SURFACE AND GROUNDWATER QUANTITY AND QUALITY, VEGETATION AND SEDIMENTATION ON A 1920-ACRE SITE BEING CONSIDERED FOR MINING.

FROM THESE DATA GUIDANCE FOR PREPARATION OF STIP-

ULATIONS IN FUTURE LEASES WILL BE PREPARED. ALTERNATE RECLAMATION TECHNIQUES AND VEGETATION TYPES WILL BE DESCRIBED. WATER MONITORS WILL REMAIN ON SITE UNTIL BASELINE CONDITIONS ARE ESTABLISHED OR UNTIL NO FURTHER CHANGES ARE ANTICIPATED IF THE AREA IS MINED AND RECLAIMED. CHEMICAL AND PHYSICAL DATA OBTAINED ON ALL GEOLOGIC STRATA TO A DEPTH OF APPROXIMATELY 200 FEET.

THE PROJECT IS LOCATED AT T3S, R45E, SECTIONS 23, 27 AND 35.

TYPE OF STUDY:
PART OF "ENERGY MINERAL REHABILITATION INVENTORY AND ANALYSIS - EMRIA" U.S. BUREAU OF LAND MANAGEMENT.

REPORTS AND PUBLICATIONS:
REPORT IS DUE JUNE 15, 1975. AVAILABLE IN MILES CITY BLM DISTRICT OFFICE, P.O. BOX 940, MILES CITY, MT 59301

00000068

PROJECT TITLE:
HANNA RECLAMATION STUDY SITE

PROJECT NUMBER:
PH 5-202

INVESTIGATORS:
DEAN SCHACTERLE
U.S. BUREAU OF RECLAMATION
DENVER, CO 80225
303-234-3358

SAM WEST
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
DENVER, CO 80225
303-778-2111

ED LANDIS
U.S. GEOLOGICAL SURVEY
GEOLOGIC DIVISION
DENVER, CO 80225
303-234-3578

PROJECT SUPERVISOR:
RONALD L. KUHLMAN
U.S. BUREAU OF LAND MANAGEMENT
D-307, BLDG. 50, DENVER FEDERAL CENTER
DENVER, CO 80225
303-234-2333

COOPERATOR:
U.S. BUREAU OF LAND MANAGEMENT

PRIMARY SPONSOR:
U.S. BUREAU OF LAND MANAGEMENT

PRIMARY FUNDING AMOUNT:
160,000 (ANNUAL MAINT. 4,000)

TIME FRAME:
07 01 74 TO 07 01 75

LOCATION:
WY

ABSTRACT:
PURPOSE: TO ESTABLISH BASELINE CONDITIONS ON SOIL, OVERBURDEN, COAL RESOURCE, SURFACE AND GROUND WATER QUANTITY AND QUALITY, VEGETATION AND SEDIMENTATION OF A 2400-ACRE SITE BEING CONSIDERED FOR MINING. FROM THESE DATA GUIDANCE FOR PREPARATION OF STIPULATIONS IN FUTURE LEASES WILL BE PREPARED. ALTERNATE RECLAMATION TECHNIQUES AND VEGETATION TYPES WILL BE DESCRIBED. WATER MONITORS WILL REMAIN ON SITE UNTIL BASELINE CONDITIONS ARE ESTABLISHED OR UNTIL NO FURTHER CHANGES ARE ANTICIPATED IF THE AREA IS MINED AND RECLAIMED. CHEMICAL AND PHYSICAL DATA OBTAINED ON ALL GEOLOGIC STRATA TO A DEPTH OF APPROXIMATELY 200 FEET.

THE PROJECT IS LOCATED AT T23N, R83W, S32 AND T24N, R84W, S36.

TYPE OF STUDY:
PART OF "ENERGY MINERAL REHABILITATION INVENTORY AND ANALYSIS - EMRIA," U.S. BUREAU OF LAND MANAGEMENT.

REPORTS AND PUBLICATIONS:
REPORT DUE DUNE 15, 1975. AVAILABLE AT RAWLINS BLM DISTRICT OFFICE, P.O. BOX 670, RAWLINS, WY 82301

00000069

PROJECT TITLE:
ALTON RECLAMATION STUDY SITE

PROJECT NUMBER:
PH 5-204

INVESTIGATORS:
DEAN JOHANSON
U.S. BUREAU OF RECLAMATION
BOULDER CITY, NV 89005
702-293-8592

RICHARD HADLEY
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
DENVER, CO 80225
303-234-4275

ED LANDIS
U.S. GEOLOGICAL SURVEY
GEOLOGIC DIVISION
DENVER,CO 80225
303-234-2333

PROJECT SUPERVISOR:
RONALD L. KUHLMAN
U.S. BUREAU OF LAND MANAGEMENT
D-307, BLDG. 50
DENVER FEDERAL CENTER
DENVER, CO 80225
303-234-2333

COOPERATOR:
U.S. BUREAU OF LAND MANAGEMENT

PRIMARY SPONSOR:
U.S. BUREAU OF LAND MANAGEMENT

PRIMARY FUNDING AMOUNT:
120,000 (ANNUAL MAINT. 4,000)

TIME FRAME:
07 01 74 TO 07 01 75

LOCATION:
UT

ABSTRACT:
PURPOSE: TO ESTABLISH BASELINE CONDITIONS ON SOIL, OVERBURDEN, COAL RESOURCE, SURFACE AND GROUND WATER ON A 2500-ACRE SITE BEING CONSIDERED FOR MINING. FROM THESE DATA GUIDANCE FOR PREPARATION OF STIPULATIONS IN FUTURE LEASES WILL BE PREPARED. ALTERNATE RECLAMATION TECHNIQUES AND VEGETAITON TYPES WILL BE DESCRIBED. WATER MONITORS WILL REMAIN ON SITE UNTIL BASELINE CONDITIONS ARE ESTABLISHED OR UNTIL NO FURTHER CHANGES ARE ANTICIPATED IF THE AREA IS MINED OR RECLAIMED. CHEMICAL AND PHYSICAL DATA OBTAINED ON ALL GEOLOGIC STRATA TO A DEPTH OF APPROXIMATELY 200 FEET.

THE PROJECT IS LOCATED AT T40S, R41/2W, S8, 17, AND 18; AND T40S, R5W, S13.

TYPE OF STUDY:
PART OF "ENERGY MINERAL REHABILITAITON INVENTORY AND ANALYSIS - EMRIA," U.S. BUREAU OF LAND MANAGEMENT.

REPORTS AND PUBLICATIONS:
REPORT IS DUE JUNE 15, 1975. AVAILABLE IN KANAB BLM DISTRICT OFFICE, 320 N 1ST E., KANAB, UT 84741

00000070

PROJECT TITLE:
TAYLOR CREEK RECLAMATION STUDY SITE

PROJECT NUMBER:
PH 5-203

INVESTIGATORS:
JOHN MCCOY

U.S. BUREAU OF RECLAMATION
OGDEN, UT
801-524-5526

JAMES BIESECKER
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
DENVER, CO 80225
303-234-3815

RICHARD HADLEY
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
DENVER FEDERAL CENTER
DENVER, CO 80225
303-234-4175

PROJECT SUPERVISORS:
RONALD L. KUHLMAN
U.S. BUREAU OF LAND MANAGEMENT
D-307, BLDG. 50
DENVER FEDERAL CENTER
DENVER, CO 80225
303-234-2333

COOPERATOR:
U.S. BUREAU OF LAND MANAGEMENT

PRIMARY SPONSOR:
U.S. BUREAU OF LAND MANAGEMENT

PRIMARY FUNDING AMOUNT:
150,000 (ANNUAL MAINT. 4,000)

TIME FRAME:
07 01 74 to 07 01 75

LOCATION:
CO

ABSTRACT:
PURPOSE: TO ESTABLISH BASELINE CONDITIONS ON SOILS, OVERBURDEN, COAL RESOURCE, SURFACE AND GROUND WATER QUANTITY AND QUALITY, VEGETATION AND SEDIMENTATION ON A 5000-ACRE SITE BEGIN CONSIDERED FOR MINING. FROM THESE DATA GUIDANCE FOR PREPARATION OF STIPULATIONS IN FUTURE LEASES WILL BE PREPARED. ALTERNATE RECLAMATION TECHNIQUES AND VEGETATION TYPES WILL BE DESCRIBED. WATER MONITORS WILL REMAIN ON SITE UNTIL BASELINE CONDITIONS ARE ESTABLISHED OR UNTIL NO FURTHER CHANGES ARE ANTICIPATED IF THE AREA IS MINED AND RECLAIMED. CHEMICAL AND PHYSICAL DATA OBTAINED ON ALL GEOLOGIC STRATA TO A DEPTH OF APPROXIMATELY 200 FEET. THE PROJECT IS LOCATED AT T4N, R93W, S33,AND 34; AND T3N, R93W, S2, 3,4,5,8,9, AND 10.

REPORTS AND PUBLICATIONS:
REPORT DUE JUNE 15, 1975. AVAILABLE AT CRAIG BLN DISTRICT OFFICE, P.O. BOX 248, CRAIG, CO 81625

00000071
PROJECT TITLE:
SURVEY OF THE VIABILITY OF INDIGENOUS GRASSES, FORBS, AND SHRUBS: TECHNIQUES OF INITIAL ACQUISITION AND TREATMENT FOR PROPAGATION IN PREPARATION FOR FUTURE LAND RECLAMATION IN THE FORT UNION BASIN
PROJECT SUPERVISOR:
LEE E. EDDLEMAN
UNIV. OF MONTANA
MISSOULA, MONTANA 59801
406-243-2573
PRIMARY SPONSOR:
U.S. ERDA, DIV. OF BIOMEDICAL & ENV. RESEARCH
RALPH E. FRANKLIN
WASHINGTON, D. C. 20545
301-973-4155
PRIMARY FUNDING AMOUNT:
50,283
TIME FRAME:
06 01 75 TO 06 01 76
LOCATION:
MT
ABSTRACT:
THE PROJECT DEALS WITH SEED MATURATION, PRODUCTION, COLLECTION, HANDLING, STORAGE, AND VIABILITY OF INDIGENOUS PLANT SPECIES IN THE FORT UNION BASIN WITH EMPHASIS ON GATHERING KNOWLEDGE USEFUL IN REVEGETATION OF SURFACE MINED LAND.

00000072
PROJECT TITLE:
ESTABLISHMENT, SUCCESSION, AND STABILITY OF VEGETATION ON SURFACE MINED LANDS IN EASTERN MONTANA
PROJECT NUMBER:
E(45-1)2228, TA3
PROJECT SUPERVISOR:
BRIAN W. SINDELAR
MONTANA STATE UNIV.

BOZEMAN, MONTANA 59715
406-994-0211
PRIMARY SPONSOR:
U.S. ERDA, DIV. OF BIOMEDICAL & ENV. RESEARCH
RALPH E. FRANKLIN
WASHINGTON, D. C. 20545
301-973-4155
PRIMARY FUNDING AMOUNT:
35,557
TIME FRAME:
06 01 75 TO 06 01 76
LOCATION:
MT
ABSTRACT:
THE PROJECT DEALS WITH THE NATURE OF PLANT ESTABLISHMENT, PLANT COMMUNITY STABILITY AND PERMANENCE AND RATE OF SOIL DEVELOPMENT ON SURFACE MINED LANDS IN SOUTHEASTERN MONTANA.

00000073
PROJECT TITLE:
LAND RECLAMATION LABORATORY PROGRAMS (6 CLOSELY RELATED GEOPHYSICAL-BIOLOGICAL PROGRAMS)
PROJECT NUMBER:
8H478
INVESTIGATORS:
R. P. CARTER; R. E. CAMERON
ARGONNE NATIONAL LABORATORY, EES DIVISION
BUILDING 12
ARGONNE, ILLINOIS 60439
312-739-7711 X5135
PRIMARY SPONSOR:
U.S. ERDA, DIV. OF BIOMEDICAL & ENV. RESEARCH
RALPH E. FRANKLIN
WASHINGTON, D. C. 20545
301-973-4155
PRIMARY FUNDING AMOUNT:
175,000
REPRESENTS A PORTION OF TOTAL CONTRACT FOR 465K THAT WILL FOCUS ON NGP.
TIME FRAME:
07 01 75 TO 07 01 76
LOCATION:
WY ND
ABSTRACT:
THE PROGRAM WILL INITIATE BASIC AND APPLIED RESEARCH INTO THE PHYSICAL AND ECOLOGICAL PROBLEMS OF LAND RECLAMATION, AND TO ADVANCE THE DEVELOPMENT OF COST-EFFECTIVE TECHNIQUES FOR RESTORING MINED LAND TO PRODUCTIVE END USES. THE PROGRAM WILL FOCUS ON NEAR- AND LONG-TERM LAND RECLAMATION PROBLEMS IN THE NORTHERN GREAT PLAINS RESOURCE REGION AND TO COORDINATE, EVALUATE, AND DISSEMINATE THE RESULTS OF RELATED STUDIES CONDUCTED AT OTHER RESEARCH INSTITUTIONS.
ONE OF THE KEY GOALS OF THIS PROGRAM WILL BE TO PROVIDE DECISION-MAKERS WITH AN APPRECIATION OF WHAT REASONABLE OPTIONS ARE AVAILABLE, AND WHAT THE COSTS OF THESE OPTIONS WILL BE.
THE ACTIVITIES OF THE LAND RECLAMATION LABORATORY WILL BE DIVIDED INTO FOUR KEY AREAS: I. GEOPHYSICAL STUDIES II. ECOSYSTEMS STUDIES III. RECLAMATION TECHNOLOGY DEVELOPMENT IV. DATA MANAGEMENT, INFORMATION SYSTEMS DEVELOPMENT AND TECHNOLOGY TRANSFER

00000074
PROJECT TITLE:
COLUMN LEACHING STUDIES OF COAL MINE SPOIL MATERIAL
PROJECT NUMBER:
OEA-75-27B
PROJECT SUPERVISOR:
GORDON K. PAGENKOPF - ASSOCIATE PROFESSOR
MONTANA STATE UNIV.
DEPT. OF CHEMISTRY
BOZEMAN, MONTANA 79515
PRIMARY SPONSOR:
U. S. ENVIRONMENTAL PROTECTION AGENCY
TERRY THOEM
OFFICE OF ENERGY ACTIVITIES
1860 LINCOLN
DENVER, COLORADO 80203
303-837-3073
PRIMARY FUNDING AMOUNT:
2,495
TIME FRAME:
02 01 75 TO 06 30 76
LOCATION:
MT - BIGHORN AND ROSEBUD COUNTIES
ABSTRACT:
INVESTIGATION REGARDING THE POSSIBILITIES OF COAL MINE SPOIL MATERIAL CONTRIBUTING SALTS TO THE SHALLOW GROUND WATER.

00000075
PROJECT TITLE:
SURFACE MINE RECLAMATION PROGRAM
PROJECT SUPERVISOR:
ALBERT GRIFFITHS, DIRECTOR
DIVISION OF CONSERVATION
SOUTH DAKOTA DEPT. OF AGRICULTURE
PIERRE, SD 57501
605-224-3258
ABSTRACT:
THE DIVISION REGULATES THE DEVELOPMENT AND RECLAMATION

```
   OF ALL SURFACE MINES FOR THE PURPOSE OF CONSERVING THIS
   STATE'S LAND, WATER AND MINERAL RESOURCES.


00000076
PROJECT TITLE:
   MINED LAND RECLAMATION RESEARCH
PROJECT SUPERVISOR:
   RICHARD L. HODDER
   MONTANA STATE UNIV., - AG. EXP. STATION
   BOZEMAN, MT  59715
PRIMARY SPONSOR:
   WESTERN ENERGY CO.
   C/O 40 E. BROADWAY
   BUTTE, MT
PRIMARY FUNDING AMOUNT:
   PROPRIETARY
TIME FRAME:
   01 01 68 TO CONTINUING
LOCATION:
   MT
ABSTRACT:
   M.S.U. (HODDER) EFFORT STARTED IN 1968 AND CONTINUES
   TODAY IN ESTABLISHING OPTIMUM RECLAMATION PROCEDURES.
   THIS HAS BEEN PIONEERING RESEARCH TO DEVELOP SELF-SUS-
   TAINING NATIVE VEGETATION EQUAL TO OR BETTER THAN PLANT
   SPECIES ON THE SITE PRIOR TO MINING.
REPORTS AND PUBLICATIONS:
   ANNUAL REPORTS FOR EACH YEAR BEGINNING IN 1969.  EACH
   REPORT HAS BEEN FILED WITH THE DEPARTMENT OF STATE LANDS,
   AND IS ALSO ON FILE IN THE MONTANA AGRICULTURAL EXPERIMENT
   STATION LIBRARY AT MONTANA STATE UNIVERSITY.


00000077
PROJECT TITLE:
   EFFECTS OF FERTILIZER RATE AND TIME OF APPLICATION ON
   A MINE SPOILS REHABILITATION SEEDING
INVESTIGATORS:
   R. L. MEYN
PROJECT SUPERVISOR:
   R. L. HODDER, PROJECT LEADER
   MONTANA AG. EXP. STATION
   BOZEMAN, MT  59715
   406-994-4821
COOPERATOR/COORDINATOR:
   WESTERN ENERGY
PRIMARY SPONSOR:
   U.S. FOREST SERVICE, SURFACE ENVIRONMENT AND MINING
   145 GRAND AVE.
   BILLINGS, MT  59102
PRIMARY FUNDING AMOUNT:
   25,000
TIME FRAME:
   06 19 74 TO 06 30 75
LOCATION:
   MT
ABSTRACT:
   PROBLEM:  REHABILITATION OF COAL SURFACE MINE SPOILS
   ON THE NORTHERN GREAT PLAINS DEPENDS ON RAPID DEVELOPMENT
   OF A MIXTURE OF INTRODUCED SPECIES AND NATIVE SPECIES
   THAT GROW SLOWER BUT ARE MORE PERMANENTLY ADAPTED TO
   THE ENVIRONMENT.  THE ROLE OF FERTILIZERS IN ENHANCING
   RAPID PLANT COVER DEVELOPMENT NEEDS INVESTIGATION.
   OBJECTIVES:  TO DETERMINE RATES OF ESTABLISHMENT,
   PRODUCTIVITY, AND SURVIVAL OF NATIVE AND INTRODUCED
   GRASSES, LEGUMES, AND SHRUBS AS AFFECTED BY FERTILIZER
   APPLICATIONS.
   METHODS AND ANALYSES:  FIELD PLOT TECHNIQUES AND VARIANCE
   ANALYSES.


00000078
PROJECT TITLE:
   SHARPTAILED GROUSE RESEARCH WITH MONTANA FISH & GAME,
   COLSTRIP, MONTANA
PROJECT SUPERVISOR:
   ROBERT E. CARROLL
   ECOLOGICAL CONSULTING SERVICE
   AIRPORT WAY BUILDING WEST
   HELENA, MONTANA  59601
COOPERATOR/COORDINATOR:
   MONTANA DEPT. OF FISH AND GAME
PRIMARY SPONSOR:
   THE MONTANA POWER CO.
   CARL R. ANDERSON
   40 E. BROADWAY
   BUTTE, MT  59701
   406-723-5421
PRIMARY FUNDING AMOUNT:
   PROPRIETARY
TIME FRAME:
   04 01 75 TO 01 01 76
LOCATION:
   MT
ABSTRACT:
   RESEARCH BETWEEN MONTANA POWER COMPANY AND WESTERN ENERGY
   COMPANY ASSISTED BY MONTANA FISH AND GAME DEPARTMENT TO
   RECREATE SHARPTAIL GROUSE BREEDING GROUNDS IN RECLAIMED
   LANDS.


00000079
PROJECT TITLE:
   TREE, SHRUB TRANSPLANT PROJECT
PROJECT SUPERVISOR:
   DON MELLGREN
```

U.S. DEPT. OF INTERIOR, BUREAU OF LAND MANAGEMENT
DENVER FEDERAL CENTER, BLDG. 50
DENVER, CO 80225
303-234-2333
COOPERATOR/COORDINATOR:
MONTANA DEPT. OF STATE LANDS
U.S. FOREST SERVICE, MISSOULA EQUIPMENT DEV. CENTER
PRIMARY SPONSOR:
U.S. DEPT. OF INTERIOR, BUREAU OF LAND MANAGEMENT
PRIMARY FUNDING AMOUNT:
8,000
TIME FRAME:
10 15 75 TO 11 01 75
LOCATION:
MT
ABSTRACT:

EVALUATE THE USE OF TREE SPADE EQUIPMENT FOR PHYSICALLY IMPLACING LOCAL TREE & SHRUB SPECIES ON RECLAIMED LANDS PREVIOUSLY DISTURBED BY COAL MINING OPERATIONS. PLANT SURVIVAL & EQUIPMENT ANALYSIS WILL BE MADE.

REPORTS AND PUBLICATIONS:
PREPARED FOLLOWING TRANSPLANT OPERATIONS IN NOVEMBER 1975.

00000080
PROJECT TITLE:
EVALUATION OF SOLID WASTE AS PHYSICAL AND CHEMICAL AMENDMENTS IN REVEGETATION OF COAL SURFACE MINE SPOILS
INVESTIGATORS:
HOWARD PEAVY
PROJECT SUPERVISOR:
R. L. SANKS
MONTANA STATE UNIV.
BOZEMAN, MT
406-994-2111
PRIMARY SPONSOR:
U.S. FOREST SERVICE, INTERMTN. FOREST & RANGE EXP. STATION
OGDEN, UTAH 84401
PRIMARY FUNDING AMOUNT:
27,006
TIME FRAME:
06 20 75 TO 06 30 76
LOCATION:
MT
ABSTRACT:

PRELIMINARY STUDIES BY THE SOUTH CENTRAL MONTANA REGIONAL PLANNING DEVELOPMENT COUNCIL INDICATE THE BEST SOLID WASTE DISPOSAL PLAN DEVELOPED FOR ELEVEN SOUTH CENTRAL COUNTIES INVOLVES POOLING ALL COLLECTION AND DISPOSAL UNDER A CENTRALIZED MANAGEMENT. SOLID WASTES FROM ALL COMMUNITIES WOULD BE PICKED UP, TRANSPORTED TO BILLINGS, AND PROCESSED AT A SINGLE, LARGE FACILITY. AFTER SEPARATION OF SALVAGABLE MATERIALS FROM THE COLLECTED WASTES, THE BALANCE OF THE MATERIAL WOULD BE PULVERIZED AND THE PULVERIZED WASTE COULD BE DISPOSED OF IN THREE WAYS: 1) SANITARY LAND FILL AT THE BILLINGS SANITARY LAND FILL SITE, 2) USE AS SOIL CONDITIONER IN THE BILLINGS AREA, OR 3) SHIPPED TO COLSTRIP IN THE RETURNING EMPTY COAL CARS AND SPREAD ON THE RECLAMATION ARE WHERE THE NEED FOR SOIL CONDITIONER IS GREATEST.

THE GENERAL OBJECTIVES OF THE STUDY ARE TO DEVELOP TECHNIQUES FOR AND TO EVALUATE THE EFFECTS OF USING MUNICIPAL SOLID WASTES AND WASTEWATER TREATMENT PLANT SLUDGE AS PHYSICAL AND CHEMICAL AMENDMENTS IN THE REVEEETATION OF COAL SURFACE-MINE SPOILS IN THE VICINITY OF COLSTRIP. THE OVERALL OBJECTIVES INCLUDE ALL PHASES OF PHYSICAL HANDLING AND ECONOMICS, CHEMICAL ANALYSIS OF SOLID WASTE CONSTITUENTS, EFFECTS OF PULVERIZED SOLID WASTES, AND THE IMPACT OF DISPOSING OF SOLID WASTES IN THIS MANNER.

THE SPECIFIC OBJECTIVES OF THE SUBJECT PROPOSED FOR THE 1975 - 1976 STUDY PERIOD INCLUDE: LIMITED CHEMICAL ANALYSES OF WASTES AND SLUDGES, ESTABLISHMENT OF RECLAMATION PLOTS AT COLSTRIP WHERE PULVERIZED SOLID WASTES WOULD BE SPREAD, SEEDING THE PLOT WITH VARIOUS GRASSES, FIELD MEASUREMENTS AND LABORATORY ANALYSES TO COMPARE EFFECTS OF AMENDMENTS WITH BARE SOIL CONDITIONS, AND NEED AND PRIORITIES FOR CONTINUING STUDIES.

00000081
PROJECT TITLE:
METHODOLOGY FOR COLLECTING AND ANALYZING SPOIL AND OVERBURDEN SAMPLES.
PROJECT NUMBER:
M-74-11
INVESTIGATORS:
F. M. SANDOVAL; W. O. WILLIS; AND R. E. RIES.
PROJECT SUPERVISOR:
J. F. POWER
NORTHERN GREAT PLAINS RESEARCH CENTER
P. O. BOX 459
MANDAN, ND 58554
PRIMARY SPONSOR:
U.S. AG. RESEARCH SERVICE, NORTHERN GREAT PLAINS RESEARCH CTR.
SURFACE ENVIRONMENT AND MINING
PRIMARY FUNDING AMOUNT:
01 01 74 TO INDEFINITE
TIME FRAME:
1975 - 20,000 ; 15,000 ANNUALLY THEREAFTER
LOCATION:
ND
ABSTRACT:

PROBLEM: IN ORDER TO COMPARE RESULTS OF LABORATORY ANALYSIS OF SAMPLES AND TO RELATE THESE DATA TO PLANT

GROWTH POTENTIAL, IT IS IMPERATIVE THAT SUITABLE METHODS OF SAMPLE COLLECTION AND ANALYSIS BE UTILIZED AND THAT SOME DEGREE OF UNIFORMITY IN TECHNIQUES EXISTS BETWEEN LABORATORIES.

OBJECTIVE: TO DEVELOP RECOMMENDED METHODS FOR THE COLLECTION AND ANALYSIS OF SPOIL AND OVERBURDEN SAMPLES.

METHODS: 1) OVERBURDEN SAMPLES COLLECTED BY SEVERAL METHODS OF DRILLING ARE EVALUATED FOR CONTAMINATION; 2) EXISTING METHODS OF LABORATORY ANALYSIS ARE SURVEYED AND METHODS RECOMMENDED ARE PUBLISHED FOR USE BY INTERESTED LABORATORIES; AND 3) REFERENCE SAMPLES OF SPOILS ARE PREPARED AND ISSUED TO INTERESTED LABORATORIES TO INSURE QUALITY CONTROL.

REPORTS AND PUBLICATIONS:

PROGRESS REPORT ON RESEARCH ON RECLAMATION OF MINED LANDS IN THE NORTHERN GREAT PLAINS. U.S. AG. RESEARCH SERVICE (NORTHERN GREAT PLAINS RESEARCH CTR.) AND NORTH DAKOTA AG. EXP. STATION, SOILS DEPT. 1975.

00000062

PROJECT TITLE:

EFFECTS OF P PLACEMENT AND TOPSOIL DEPTH ON CROP GROWTH, ROOTING, AND P AVAILABILITY ON COAL MINE SPOIL MATERIALS

PROJECT NUMBER:

M-75-1

INVESTIGATORS:

G. A. REICHMAN; J. F. POWER (ARS)
A. BAUER; F. NYREN (NORTH DAKOTA STATE UNIV.)

PROJECT SUPERVISOR:

J. F. POWER
NORTHERN GREAT PLAINS RESEARCH CTR.
P. O. BOX 459
MANDAN, ND 58554

COOPERATOR/COORDINATOR:

SOILS DEPT., NDSU;
KNIFE RIVER COAL CO., BEULAH, ND

PRIMARY SPONSOR:

U.S. AG. RESEARCH SERVICE

PRIMARY FUNDING AMOUNT:

25,000 ANNUALLY

TIME FRAME:

01 01 75 TO 12 30 77

LOCATION:

ND

ABSTRACT:

PROBLEM: EARLIER RESEARCH HAS SHOWN THAT P FERTILIZATION SPOILS IS ESSENTIAL FOR ECONOMIC PLANT GROWTH. HOWEVER, NOTHING IS KNOWN OF THE CHEMISTRY OF FERTILIZER P ADDED TO SPOILS, OR, OF THE RELATIVE AVAILABILITY TO PLANTS OF P IN SPOILS, SOIL, AND FERTILIZER ON TYPICAL MINED-LAND.

OBJECTIVES: TO EVALUATE THE FORMS, TRANSFORMATIONS, AND RELATIVE AVAILABILITY TO PLANTS OF P IN SOILS, SPOILS, AND FERTILIZERS.

METHODS: RADIOACTIVE TREBLE SUPERPHOSPHATE IS APPLIED TO THE SURFACE OF SPOILS ON SELECTED PLOTS PRIOR TO COVERING WITH UP TO 24 INCHES OF TOPSOIL. ADDITIONAL P32 FERTILIZER IS ALSO APPLIED WITH SPRING WHEAT SEED ON SELECTED PLOTS IN SUCH A MANNER THAT THE TOTAL P IN PLANT SAMPLES COLLECTED PERIODICALLY DURING THE GROWING SEASON CAN BE FRACTIONATED INTO THAT FROM SOIL, FROM SPOIL, AND FROM FERTILIZER. SIMILAR INFORMATION IS ALSO OBTAINED FROM CORN. ADDITIONAL MINERALOGICAL AND CHEMICAL ANALYSES ARE EMPLOYED TO OUTLINE THE TRANSFORMATION OF P THAT OCCUR WITHIN THE SYSTEM. SOIL WATER AND DATA ON PLANT UPTAKE OF P PROVIDE INFORMATION ON ROOTING DEPTH AND ACTIVITY.

STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE AND REGRESSION ANALYSIS.

00000053

PROJECT TITLE:

EVALUATION OF LEACHING WATERS ON HYDRAULIC CONDUCTIVITY OF SODIC SPOILS AND ON CALCIUM EXCHANGE EFFICIENCY.

PROJECT NUMBER:

M-75-2

INVESTIGATORS:

E. J. DOERING; W. O. WILLIS

PROJECT SUPERVISOR:

J. F. POWER
NORTHERN GREAT PLAINS RESEARCH CTR.
P. O. BOX 459
MANDAN, ND 58554

COOPERATOR/COORDINATOR:

CONSOLIDATION COAL CO. -STANTON)
BASIN ELECTRIC COOPERATIVE

PRIMARY SPONSOR:

U.S. AG. RESEARCH SERVICE
SURFACE ENVIRONMENT AND MINING

PRIMARY FUNDING AMOUNT:

20,000 ANNUALLY

TIME FRAME:

01 01 75 TO 12 30 78

LOCATION:

ND

ABSTRACT:

PROBLEM: EARLIER RESEARCH HAS ESTABLISHED THAT MANY SPOILS ARE HIGH IN EXCHANGEABLE SODIUM AND CONSEQUENTLY ARE RELATIVELY IMPERMEABLE TO WATER.

OBJECTIVES: TO EVALUATE THE EFFECTS OF VARYING CHEMICAL CONCENTRATIONS AND COMPOSITION OF LEACHING WATERS UPON HYDRAULIC CONDUCTIVITY AND SUBSEQUENT PLANT GROWTH FOR SODIC SPOILS.

METHODS: LABORATORY COLUMN STUDIES ARE CONDUCTED TO DETERMINE RELATIONS BETWEEN COMPOSITION AND CONCENTRATION OF VARIOUS LEACHING SOLUTIONS AND HYDRAULIC CONDUCTIVITY

OF SPOILS. MATHEMATICAL PROCEDURES ARE DEVELOPED WHEREBY THE QUANTITY OF LEACHING SALT REQUIRED TO AFFECT THE REQUIRED CHANGE IN CONDUCTIVITY CAN BE CALCULATED. INFORMATION OBTAINED FOR MOST PROMISING TREATMENTS IS APPLIED TO FIELD PLOTS UPON WHICH VEGETATION IS GROWN.
STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE AND REGRESSION ANALYSIS.
SUMMARY: RESULTS OF LABORATORY INVESTIGATIONS HAVE ESTABLISHED THAT APPROXIMATELY 0.75N CACL2 SOLUTIONS ARE HIGHLY EFFECTIVE IN INCREASING HYDRAULIC CONDUCTIVITY OF SPOILS WITH ESP OF ABOUT 25. A METHOD FOR CALCULATING THE LEACHING REQUIREMENT HAS BEEN DEVELOPED. FIELD STUDIES ARE NOW IN PROGRESS.

REPORTS AND PUBLICATIONS:
DOERING, E. J. AND W. O. WILLIS.
OF SODIC STRIP-MINE SPOILS. USDA-ARS-NC-20. 1975. 8P.

00000084

PROJECT TITLE:
ESTABLISHMENT OF RANGE GRASSES ON DISTURBED LAND USING IRRIGATION.

PROJECT NUMBER:
M-75-3

INVESTIGATORS:
R. E. RIES; R. F. FOLLETT; F. M. SANDOVAL

PROJECT SUPERVISOR:
J. F. POWER
NORTHERN GREAT PLAINS RESEARCH CTR.
P. O. BOX 459
MANDAN, ND 58554

COOPERATOR/COORDINATOR:
CONSOLIDATION COAL CO.
BASIN ELECTRIC COOPERATIVE

PRIMARY SPONSOR:
U.S. AG. RESEARCH SERVICE, NORTHERN GR. PLAINS RESEARCH CTR.

PRIMARY FUNDING AMOUNT:
1975 - 40,000 ; 25,000 ANNUALLY THEREAFTER.

TIME FRAME:
01 01 75 TO 12 30 81

LOCATION:
ND

ABSTRACT:
PROBLEM: ESTABLISHMENT OF STABLE GRASS COMMUNITIES ON DISTURBED LANDS HAS NOT YET BEEN PROVEN, AND APPEARS TO BE A LONG TEDIOUS PROCESS IF POSSIBLE AT ALL.
OBJECTIVES: TO STIMULATE RATE OF SUCCESSION OF NATIVE SPECIES DURING REVEGETATION OF DISTURBED LANDS THROUGH THE USE OF VARIABLE PLANTING DATES AND IRRIGATION TREATMENTS.
METHODS: SEVERAL MIXTURES OF NATIVE AND ADAPTED EXOTIC SPECIES, SELECTED TO PROVIDE GRAZING CAPABILITIES SIMILAR TO THOSE OF THE NATIVE MIXED PRAIRIE, ARE SEEDED AT SEVERAL DATES DURING THE SUMMER AND ARE IRRIGATED AT DIFFERENT RATES AND FREQUENCIES DURING THE YEAR OF ESTABLISHMENT. NO IRRIGATION IS APPLIED THEREAFTER. DATA ARE COLLECTED ON SEEDLING EMERGENCE, SURVIVAL, AND GROWTH DURING ESTABLISHMENT AND FOR SEVERAL YEARS THEREAFTER TO DETERMINE HOW STABLE AND PRODUCTIVE COMMUNITIES CAN BEST BE ESTABLISHED.
STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE AND REGRESSION ANALYSIS.

00000085

PROJECT TITLE:
PROJECT RECLAMATION: A SYSTEMS APPROACH TO MINED LAND RECLAMATIO

PROJECT SUPERVISOR:
ALDEN KOLLMAN
PROJECT RECLAMATION
UNIVERSITY OF NORTH DAKOTA
GRAND FORKS,ND 58202
701-777-3026

PRIMARY SPONSOR:
U.S. BUREAU OF MINES
MICHAELANN HARTHILL, TECH. OFFICER
DENVER MINING RESEARCH CENTER
FEDERAL CENTER, BLDG. 20
DENVER, CO 80225

PRIMARY FUNDING AMOUNT:
1,000,000

TIME FRAME:
08 01 75 TO 07 31 80

LOCATION:
ND - SPOIL AREAS

ABSTRACT:
THE PURPOSE OF PROJECT RECLAMATION IS TO INVESTIGATE THE NATURE OF SPOILED MATERIALS OVERTURNED IN THE PROCESS OF COAL MINING IN ORDER TO PROVIDE BETTER MEANS OF RETURNING LAND TO ITS ORIGINAL PRODUCTIVITY. THIS INTERDISCIPLINARY SYSTEMS APPROACH TO MINED LAND RECLAMATION ENCOMPASSES THE FOLLOWING:
A) STUDYING THE CHEMICAL CHARACTERISTICS OF SPOIL MATERIALS
B) STUDYING THE EFFECT OF LEONARDITE (A NATURALLY OXIDIZED COAL) ON THESE CHEMICAL CHARACTERISTICS.
WORK IS BEING DONE WITH ONSITE TEST PLOTS AND CONTROLLED ENVIRONMENT CHAMBERS.

```
00000066
PROJECT TITLE:
   EVALUATION OF POTENTIAL PHYSICAL, BIOLOGICAL, AND WATER USE
   IMPACTS OF WATER WITHDRAWALS AND WATER DEVELOPMENT ON THE
   MIDDLE AND LOWER PORTIONS OF THE YELLOWSTONE RIVER DRAINAGE
   IN THE STATE OF MONTANA.
PROJECT NUMBER:
   10470022
INVESTIGATORS:
   ROBERT ANDERSON 406-449-2872
PROJECT SUPERVISOR:
   GARY WICKS
   MONTANA DEPARTMENT OF NATURAL RESOURCES
   32 S. EWING
   HELENA, MT  59601
   406-449-2872
PRIMARY SPONSOR:
   OLD WEST REGIONAL COMMISSION
   KENNETH BLACKBURN
   PRATT BLDG.  306A
   BILLINGS, MT  59101
   406-245-6711 X6665
PRIMARY FUNDING AMOUNT:
   550,000
TIME FRAME:
   06 25 74 TO 06 30 76
LOCATION:
   MT
ABSTRACT:
   THE OBJECTIVES OF THIS PROJECT ARE:
   1.  TO REFINE, CALIBRATE, AND EVALUATE A SURFACE WATER FLOW
   MODEL FOR THE MIDDLE AND LOWER PORTIONS OF THE YELLOWSTONE
   RIVER BASIN, WITH ATTENTION TO THE MODEL'S UTILITY AS A
   REGIONAL PROTOTYPE.
   2.  TO ACQUIRE DATA WHICH RELATES THE SURFACE FLOW PARAMETERS
   OF THE MODEL TO IMPACTS ON SELECTED WATER USES, E.G. FISH
   POPULATIONS AND OTHER AQUATIC COMMUNITIES, IRRIGATION, MUNICI-
   PAL AND INDUSTRIAL CONSUMPTION OF WATER AND WATER
   BASED RECREATION.
   3.  TO QUANTIFY, INSOFAR AS POSSIBLE, THE ECONOMIC VALUES AND
   COSTS OF VARIOUS DEGREES OF WATER CONSUMPTION WITH ATTENTION TO
   CONFLICTS AND TRADEOFFS ASSOCIATED WITH FORESEEABLE WATER USE
   CONFIGURATIONS.


00000067
PROJECT TITLE:
   INVESTIGATION OF POTENTIAL RECHARGE TO GROUNDWATER RESERVOIRS
   OF NORTHEASTERN WYOMING, THE POWDER RIVER BASIN
PROJECT NUMBER:
   10470021
INVESTIGATORS:
   A. J. MANCINI  307-777-7626
PROJECT SUPERVISOR:
   GEORGE L. CHRISTOPULOS
   WYOMING STATE ENGINEER'S OFFICE
   STATE OFFICE BUILDING EAST
   CHEYENNE, WY  82002
   307-777-7626
PRIMARY SPONSOR:
   OLD WEST REGIONAL COMMISSION
   KENNETH BLACKBURN
   PRATT BLDG.  306A
   BILLINGS, MT  59101
   406-245-6711 X6665
PRIMARY FUNDING AMOUNT:
   300,000
TIME FRAME:
   06 26 74 TO 06 30 76
LOCATION:
   SD WY
ABSTRACT:
   THE OBJECTIVES OF THE PROJECT ARE:
   1.  TO DETERMINE SURFACE WATER-GROUNDWATER RELATIONS IN
   RECHARGE AREAS, INCLUDING EFFECTIVE RATES OF INFILTRATION
   AND PRECIPITATION AND SURFACE RUNOFF.
   2.  TO DEVELOP METHODOLOGY THAT CAN BE USED TO CALCULATE OR
   ESTIMATE PERENNIAL AVAILABILITY OF GROUNDWATER AT SPECIFIC
   LOCATIONS.


00000068
PROJECT TITLE:
   CONDENSER COOLING WATER DISCHARGE STUDIES--DAVE
   JOHNSTON PLANT
INVESTIGATORS:
   J.A.R. HAMILTON
RESEARCH FACILITY:
   PACIFIC POWER & LIGHT CO.
   920 S.W. 6TH AVE.
   PORTLAND, OR  97204
PRIMARY SPONSOR:
   PACIFIC POWER & LIGHT CO.
PRIMARY FUNDING AMOUNT:
   1972 - 10,000
   1973 - 20,000
   1974 - 55,000
TIME FRAME:
   01 01 72 - CONTINUING
LOCATION:
   WY
ABSTRACT:
   OBJECTIVES: TO DETERMINE THE DISPERSAL CHARACTERISTICS OF
   HEATED WATER FROM THE DAVE JOHNSTON PLANT AND THE EFFECT
```

OF HEATED WATER ON TEMPERATURES OF THE NORTH PLATTE RIVER. TEMPERATURE RECORDING STATIONS HAVE BEEN ESTABLISHED UPSTREAM FROM THE POINTS OF DISCHARGE AND THE PLANT INTAKE AND AT TWO POINTS BELOW THE DISCHARGE. CROSS SECTIONAL MEASUREMENTS HAVE BEEN MADE AT SEASONAL INTERVALS.

00000089

PROJECT TITLE:
HYDROLOGY STUDY

INVESTIGATORS:
R. HODDER; A. F. GRANDT; G. TUMA

RESEARCH FACILITY:
MONTANA STATE UNIV., AG. EXP. STATION
BOZEMAN, MT 59715

PRIMARY SPONSOR:
PEABODY COAL CO.

PRIMARY FUNDING AMOUNT:
PROPRIETARY

TIME FRAME:
01 01 70 TO INDEFINITE

LOCATION:
MT

ABSTRACT:
SEVERAL DIFFERENT SUBJECTS ARE BEING INVESTIGATED AT BIG SKY MINE: 1. HYDROLOGY. THE OBJECTIVES OF THIS STUDY ARE TO DETERMINE BOTH SHORT AND LONG RUN EFFECTS OF SURFACE MINING ON WATER QUALITY AND STORAGE, STREAM FLOW AND GROUND WATER. 2. RANGE INVENTORY. TO STUDY THE EFFECTS OF MINING ACTIVITIES ON THE ECOLOGY OF AN ARID REGION. THE PLANTS GROWING PRIOR TO MINING ARE LISTED AS TO GENUS AND SPECIES, QUANTITY AND QUALITY, ETC. SUCH INFORMATION WILL BE USED TO STUDY RANGE WILDLIFE RELATIONSHIPS AND THE EFFECT OF MINING.

00000090

PROJECT TITLE:
EFFECTS OF STRIP MINING OF COAL ON SHALLOW GROUND WATER AQUIFERS IN THE EASTERN POWDER RIVER BASIN OF WYOMING.

PROJECT NUMBER:
16-420-CA

INVESTIGATORS:
PAUL A. RECHARD
DIRECTOR WWRRI
UNIVERSITY OF WYOMING
LARAMIE, WY 82006

PROJECT SUPERVISOR:
HOWARD K. ORR, HYDROLOGIST
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY
RAPID CITY, SD 57701

COOPERATOR/COORDINATOR:
AMAX COAL CO.
UNIVERSITY OF WYOMING

PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468

PRIMARY FUNDING AMOUNT:
12000

SECONDARY FUNDING AMOUNTS:
6656

TIME FRAME:
74 TO 75 (FIRST PHASE)

LOCATION:
WY

ABSTRACT:
PROBLEM: WHAT EFFECTS DO DISRUPTIONS OF AQUIFERS BY SURFACE MINING OF THICK COAL BEDS HAVE ON SURFACE FLOWS, IMPOUNDMENTS, AND WATERWELLS AND WHAT STEPS CAN BE TAKEN TO MINIMIZE UNDESIRABLE IMPACT.

OBJECTIVES: DETERMINE HYDRAULIC PROPERTIES OF SHALLOW AQUIFERS IN THE AMAX BELLE AYR SOUTH MINE VICINITY, IDENTIFY THE REGIONAL FLOW PATTERN, AND POSTULATE THE FEASIBILITY OF RECHARGING THE GROUND WATER SYSTEM THROUGH DIVERSION OF SURFACE FLOWS INTO ABANDONED MINE SITES.

METHODS: INSTALL AND OPERATE GROUND WATER WELLS TO PROVIDE DATA FOR DETERMINING DEPRESSION OF THE GROUND WATER TABLE IN THE MINE VICINITY, AND UPON WHICH TO BASE REGIONAL POTENTIOMETRIC MAPS.

STATISTICAL ANALYSIS: ANOV OF ELEVATIONS AND FLUCTUATIONS OF GROUND WATER LEVELS.

REPORTS AND PUBLICATIONS:
WORK PLAN: 1974
REPORTS: ESTABLISHMENT: 1974
INTERIM: 1975
FINAL: FIRST PHASE BY JULY 31, 1975

00000091

PROJECT TITLE:
TREND-SURFACE ANALYSIS OF POWDER RIVER BASIN, WYOMING, WYOMING-MONTANA, AND WILLISTON BASIN, NORTH DAKOTA

PROJECT NUMBER:
RM-811

INVESTIGATORS:
TERUO YAMAMOTO
RM-1662
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECH.
RAPID CITY, SD 57701

PROJECT SUPERVISOR:
ARDELL J. EJUGSTAD
RM-1711

FOREST RESEARCH LAB
SOUTH DAKOTA SCHOOL OF MINES & TECH.
RAPID CITY, SD 57701
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
FY 75 - 4500
FY 76 - 4500
TIME FRAME:
09 01 74 TO 06 01 76
LOCATION:
MT ND WY
ABSTRACT:

PROBLEM: A PREMINING QUANTITATIVE EVALUATION OF TOPOGRAPHIC FEATURES IN THE ACTIVE AND ANTICIPATED COAL AND BENTONITE STRIP MINING AREAS OF THE NORTHERN GREAT PLAINS IS NEEDED WHICH WILL PROVIDE SOME INSIGHTS INTO BASIN QUESTIONS INCLUDING THE FOLLOWING: 1. HOW CLOSELY SHOULD THE TOPOGRAPHY BE RETURNED TO THE WAY IT WAS BEFORE MINING? 2. WHAT WILL BE THE BEST DRAINAGE SYSTEM FOR THE AREA, AND WHAT ARE SOME OF THE ALTERNATIVES? AND 3. WHAT CAN WE ANTICIPATE IN TERMS OF CHANGES IN SURFACE AND SUBSURFACE HYDROLOGY BETWEEN DISTURBED AND UNDISTURBED LANDS?

OBJECTIVES: SPECIFIC OBJECTIVES ARE TO: 1. QUANTIFY SELECTED TOPOGRAPHIC PARAMETERS ON TOPOGRAPHIC MAPS, 2. DETERMINE SIGNIFICANT TOPOGRAPHIC DISTINCTIVENESS OF VARIATIONS EXISTING IN THE STUDY AREA, 3. DETERMINE THE MOST MEANINGFUL TOPOGRAPHIC VARIABLES THAT ARE USEFUL IN DESCRIBING THE STUDY AREA, AND 4. ASSOCIATE TOPOGRAPHIC DIFFERENCES TO GEOMORPHOLOGICAL PROCESSES AND DERIVE GEOHYDROLOGIC IMPLICATIONS RELATED TO DISRUPTION OF TOPOGRAPHY.

METHODS: LANDFORM PARAMETERS WILL BE MEASURED IN THREE DIMENSIONS ON TOPOGRAPHIC MAPS PRINTED BY THE U.S. GEOLOGICAL SURVEY FOR THE POWDER RIVER BASIN IN WYOMING AND MONTANA. THE RAW MAP DATA IS THEN CONVERTED TO TREN-MAPS WHICH ARE MATEHMATICALLY COMPUTED PLANES OR GENTLY CURVING SURFACES THAT REPRESENT GENERAL TRENDS. THESE SURFACES ARE DESCRIBED IN TERMS OF Z # F-X,Y) BY A POWER SERIES FITTED BY THE LEAST SQUARES METHOD.

STATISTICAL ANALYSIS: TREND-SURFACE ANALYSIS OF MAP DATA INVOLVES THE FITTING OF POLYNOMINAL SURFACES TO THE MAP PARAMETERS BY MEANS OF THE GENERAL LINEAR MODEL USING THE LEAST SQUARES METHOD.

REPORTS AND PUBLICATIONS:
WORK PLAN: JUNE 30, 1974
REPORTS: ESTABLISHMENT: DECEMBER 1974
INTERIM: ANNUAL - MAY 1975
FINAL: MAY 1976

00000092
PROJECT TITLE:
PRELIMINARY EVALUATION AND DEVELOPMENT OF A PLAN OF STUDY, MADISON LIMESTONE, NORTHERN GREAT PLAINS
PROJECT NUMBER:
CR 75-1850
INVESTIGATORS:
ELLIOTT R. CUSHING
U.S. GEOLOGICAL SURVEY, WRD
8209 SATYR HILL ROAD
PARKVILLE MARYLAND 21234
301-661-4664
PROJECT SUPERVISOR:
ALFRED CLEBSCH, JR., REGIONAL HYDROLOGIST
U.S. GEOLOGICAL SURVEY, WRD
BLDG 25 - DENVER FEDERAL CENTER
LAKEWOOD, CO 80225
303-234-3661
COOPERATOR/COORDINATOR:
U.S. GEOLOGICAL SURVEY, WRD
NATIONAL CENTER, RESTON, VA 22092
703-860-6921
PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
DR. KENNETH A. BLACKBURN
PRATT BUILDING, SUITE 306A
BILLINGS, MT 59101
406-245-6711 X6665
SECONDARY SPONSORS:
U.S. GEOLOGICAL SURVEY, WRD
NATIONAL CENTER, RESTON, VA 22092
703-860-6921
PRIMARY FUNDING AMOUNT:
170,000
TIME FRAME:
01 01 75 TO 10 31 75
LOCATION:
WY SD MT ND CO
ABSTRACT:

THE GENERAL PURPOSE OF THIS STUDY IS TO QUANTITATIVELY ASSESS THE POTENTIAL OF THE MADISON LIMESTONE SYSTEM AND ASSOCIATED DEEP AQUIFERS AS A SOURCE OF WATER FOR INDUSTRIAL USE IN THE FORT UNION COAL REGION. THE STUDY IS INTENDED TO PROVIDE SCIENTIFICALLY BASED ANSWERS TO QUESTIONS SUCH AS: HOW MUCH WATER CAN BE PUMPED FROM THE MADISON LIMESTONE AND HYDRAULICALLY CONNECTED ROCKS WITHOUT (A) INTERFERING WITH EXISTING WELLS, (B) ADVERSELY AFFECTING WATER QUALITY IN MUNICIPAL AND DOMESTIC WELLS, (C) AFFECTING THE FLOW OF STREAMS THAT CROSS SURFACE OUTCROPS OF THE MADISON. THE OBJECTIVE OF THIS PROJECT IS TO DEVELOP A PLAN OF STUDY FOR A QUANTITATIVE INVESTIGATION INVOLVING LARGE EXPENDITURES FOR DRILLING AND TESTING

THE HYDRAULIC AND HYDROLOGIC PROPERTIES OF THE MADISON LIMESTONE AND ASSOCIATED DEEP ROCKS. AVAILABLE DATA FROM EXISTING WELLS WILL BE COMBINED WITH GEOPHYSICAL AND OTHER DATA PURCHASED FROM INDUSTRY TO PLAN A DRILLING AND TESTING PROGRAM. AN INTERMEDIATE STEP INCLUDES THE PREPARATION OF A DIGITAL MODEL OF THE SYSTEM TO SERVE AS A GUIDE TO ADDITIONAL DATA COLLECTION AND TO DETERMINE RELATIVE SENSITIVITIES AND HENCE THE IMPORTANCE OF THE SEVERAL TYPES OF DATA ON WHICH THE MODEL IS BASED. STREAMFLOW RECORDS WILL BE OBTAINED AND ANALYZED TO DETERMINE RELATIONSHIPS BETWEEN STREAMFLOW QUANTITIES AND CHANGES IN POTENTIOMETRIC HEAD. SAMPLES OF SURFACE AND GROUND WATER WILL BE ANALYZED SO THAT GEOCHEMISTRY OF THE WATER MAY BE USED TO GAIN A BETTER UNDERSTANDING OF HOW THE FLOW SYSTEM OPERATES. THE DIGITAL MODEL WILL BE RECALIBRATED AS ADDITIONAL DATA BECOME AVAILABLE. IN SUMMARY, THE IMMEDIATE OBJECTIVE OF THIS PROJECT IS TO PLAN THE MAJOR HYDROLOGIC INVESTIGATION. THE ULTIMATE OBJECTIVE OF THE MAJOR INVESTIGATION IS TO DEVELOP A SOUND UNDERSTANDING OF THE HYDRAULIC AND HYDROLOGIC SYSTEM, BACKED UP BY RELIABLE TECHNICAL DATA AND APPLIED TO A PREDICTION ANALYSIS OF THE SYSTEM THAT CAN BE USED FOR WATER RESOURCES DEVELOPMENT.

REPORTS AND PUBLICATIONS:

W. R. MILLER, 1975. 'GROUND WATER IN THE MADISON GROUP IN EASTERN MONTANA: MONTANA STATE REPT.' (IN PREPARATION).

F. A. SWENSON, W. G. HODSON, ET AL. 'WATER IN THE MADISON GROUP, POWDER RIVER, WYOMING AND MONTANA: U.S. GEOL. SURVEY FOLIO.' 1975 (IN PREPARATION)

U.S. GEOLOGICAL SURVEY (F. A. SWENSON), 1974. 'POSSIBLE DEVELOPMENT OF WATER FROM MADISON GROUP AND ASSOCIATED ROCK IN POWDER RIVER BASIN, MONTANA-WYOMING, NORTHERN GREAT PLAINS RESOURCE PROGRAM.'

00000093

PROJECT TITLE:

DETERMINATION OF THE INFLUENCE OF SUBSURFACE GEOLOGIC MATERIALS ON REHABILITATION POTENTIAL AND OF THE EFFECTS OF SURFACE MINING ON SHALLOW GROUNDWATER SUPPLIES

PROJECT NUMBER:

NDSPD-MLPG-NDGS-C02-001

INVESTIGATORS:

GERALD GROENWALD
FRED SCHROER
NORTH DAKOTA STATE UNIVERSITY, DEPT. OF SOILS
FARGO, ND 58102
701-237-8883

PROJECT SUPERVISOR:

STEPHEN MORAN
NORTH DAKOTA GEOLOGICAL SURVEY
GRAND FORKS, ND 58201
701-777-2231

COOPERATOR/COORDINATOR:

DIRECTOR, STATE PLANNING DIVISION
CAPITOL BUILDING
BISMARCK, ND 58505
701-224-2818

PRIMARY SPONSOR:

OLD WEST REGIONAL COMMISSION
WILLIAM FOGARTY
PRATT BUILDING, SUITE 306A
BILLINGS, MT 59101
406-245-6711 X6665

PRIMARY FUNDING AMOUNT:

101,898

TIME FRAME:

07 18 74 TO 06 30 76

LOCATION:

ND

ABSTRACT:

PURPOSES (1) MATERIALS DERIVED FROM THE FT. UNION GROUP CONTAIN SIGNIFICANT AMOUNTS OF SODIUM; MATERIALS PRESENT AS GLACIAL DRIFT GENERALLY DO NOT. IT IS NOT CLEAR WHETHER THIS RELATIONSHIP HOLDS THROUGHOUT THE ENTIRE FT. UNION AREA. DIFFERENT LAYERS WITHIN GLACIAL DRIFT AND WITNIN FT. UNION BEDROCK HAVE DIFFERENT POROSITY AND PERMEABILITY CHARACTERISTICS. THESE CHEMICAL AND PHYSICAL PROPERTIES MAY INFLUENCE ROOT PENETRATION AND THE RATE OF WATER MOVEMENT THROUGH THE SPOIL, CONTROLLING TO A LARGE DEGREE THE RATE AT WHICH A SUITABLE, STABLE SOIL PROFILE CAN BE RECREATED. (2) SINCE LIGNITE BEDS CAN BE IMPORTANT AQUIFERS, IT IS NECESSARY TO DETERMINE DIRECTION, LOCATION AND VELOCITY OF GROUNDWATER FLOWS AS WELL AS THE CHEMICAL QUALITY OF GROUNDWATER PRIOR TO MINING. MONITORING THESE PROPERTIES DURING AND AFTER MINING AND REHABILITATION IS NECESSARY TO DETERMINE THE DEGREE OF MODIFICATION OF GROUNDWATER QUALITY AND QUANTITY. PROCEDURES: A. GEOLOGICAL DATA COLLECTION AND INTERPRETATION: 1) COLLECTION OF DATA FROM TEST DRILLING PROGRAMS; 2) PREPARATION OF DESCRIPTIVE LOG FROM CUTTING SAMPLES; 3) COMBINATION OF GEOPHYSICAL LOGS AND DESCRIPTIVE LOGS TO DEVELOP FINAL LOG OF EACH HOLE; 4) CORRELATION OF GEOLOGIC MATERIALS, FOLLOWED BY PREPARATION OF CROSS-SECTIONS AND MAPS TO SHOW DISTRIBUTION AND THICKNESS OF SIGNIFICANT GEOLOGIC UNITS; 5) DRILL ADDITIONAL HOLES TO PROVIDE SAMPLES OF SIGNIFICANT UNITS FOR ANALYTICAL PURPOSES. B. GROUNDWATER STUDY: 1) INSTALL NETWORK OF GROUNDWATER MONITORING WELLS A) STANDPIPE PIEZOMETERS COMPLETED IN COAL AND PERMEABLE ZONES ABOVE AND BELOW COAL B) WATER LEVELS MEASURED; CONSTRUCTION OF HYDROGRAPHS C) MAJOR ION ANALYSES. C. APPLICATION OF GEOLOGIC DATA TO REHABILITATION

TYPE OF STUDY:

PART OF 'NORTH DAKOTA RECLAMATION STUDY,' OLD WEST REGIONAL COMMISSION

00000094
PROJECT TITLE:
POTENTIAL IMPACTS TO GROUND-WATER AND SURFACE-WATER QUALITY AND QUANTITY FROM PROPOSED ENERGY DEVELOPMENT ON THE NORTHERN CHEYENNE RESERVATION, MONTANA
PROJECT NUMBER:
R803566 01
INVESTIGATORS:
WILLIAM W. WOESSNER; WILLIAM MAXFIELD
DIRECTOR, NORTHERN CHEYENNE RESEARCH PROJECT
BOX 248
BUSBY, MT 59016
406-592-3616
PRIMARY SPONSOR:
U.S. ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OH 45268
513-648-8348
SECONDARY SPONSORS:
U.S. DEPT. OF HEALTH, EDUCATION & WELFARE, OFFICE OF NATIVE AMERICAN PROGRAMS
WASHINGTON, D.C. 20201
PRIMARY FUNDING AMOUNT:
639,338
TIME FRAME:
06 01 75 TO 08 31 78
LOCATION:
MT
ABSTRACT:
THE NORTHERN CHEYENNE TRIBE, VIA THE NORTHERN CHEYENNE RESEARCH PROJECT, DESIRES TO DEVELOP AN IN-DEPTH KNOWLEDGE OF THE CHEMICAL AND PHYSICAL CHARACTER OF RESERVATION WATER RESOURCES, AND THE INTERRELATION OF WATER TO OTHER RESOURCES SO THAT THE TRIBE CAN MAKE INFORMED CHOICES IN PLANNING COAL DEVELOPMENT. A THREE-YEAR STUDY PLAN IS PROPOSED TO: (1)GATHER AND INTERPRET BASELINE DATA CONCERNING THE WATER RESOURCES AND THE INTERRELATIONSHIPS OF THESE DATA TO LAND, BIOCOMMUNITY, SUPPLY NEEDS, AND ENERGY RESOURCES OF THE RESERVATION; (2)ASCERTAIN POTENTIAL ADVERSE CHEMICAL, PHYSICAL, AND ECONOMIC IMPACTS TO RESERVATION WATER RESOURCES FROM COAL DEVELOPMENT, AND (3) DEVELOP A COMPREHENSIVE WATER RESOURCES MANAGEMENT PLAN THAT WILL AID PRESENT AND FUTURE PLANNING FOR RESOURCE EXPLOITATION. STANDARD FIELD AND LABORATORY METHODOLOGY WILL BE EMPLOYED IN ASSESSING THE GEOLOGY, SURFACE WATER, AND GROUND WATER OF RESERVATION LANDS. PROFESSIONAL HELP WILL BE HIRED AS NEEDED TO DIRECT PHASES OF FIELD WORK AND ASSIST IN FINAL REPORT PREPARATION.

00000095
PROJECT TITLE:
YELLOWSTONE RIVER FISHERIES STUDY
PROJECT NUMBER:
1510
INVESTIGATORS:
LARRY PETERMAN
PROJECT SUPERVISOR:
AL ELSER
MONTANA DEPT. OF FISH & GAME
MILES CITY, MT 59301
406-232-4365
PRIMARY SPONSOR:
U.S. DEPT. OF INTERIOR, BUREAU OF RECLAMATION
FEDERAL BUILDING
BILLINGS, MT 59101
206-245-6711
PRIMARY FUNDING AMOUNT:
1975 - 23,000
TIME FRAME:
04 01 74 TO 04 01 76
LOCATION:
MT
ABSTRACT:
THIS RESEARCH IS ATTEMPTING TO DETERMINE SPECIES OF FISH WHICH ARE PRESENT IN THAT PART OF THE RIVER AND FEATURES OF LIFE HISTORY WHICH MIGHT BE AFFECTED BY CHANGES IN THE FLOW REGIME RESULTING FROM DIVERSION OF WATER FOR ENERGY.

00000096

PROJECT TITLE:
SURFACE AND SUBSURFACE WATER QUALITY HYDROLOGY IN MINE SPOILS

PROJECT NUMBER:
R 803175-02

INVESTIGATORS:
RODNEY K. SKOGERBOE
NATURAL SCIENCES AND CHEMISTRY DEPT.
COLORADO STATE UNIV.
FORT COLLINS, CO 80521

PROJECT SUPERVISOR:
DAVID B. MCWHORTER
AG. ENGINEERING DEPT.
COLORADO STATE UNIV.
FORT COLLINS, CO 80521

PRIMARY SPONSOR:
U.S. ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI NATIONAL ENVIRONMENTAL RESEARCH CENTER
CINCINNATI, OH 45268

PRIMARY FUNDING AMOUNT:
FY 76 - 146,812

TIME FRAME:
07 01 74 TO 06 30 76

LOCATION:
CO

ABSTRACT:

THE OBJECTIVE OF THIS PROJECT IS TO DEVELOP A MATHEMATICAL MODEL CAPABLE OF PREDICTING THE QUANTITY AND QUALITY OF SURFACE AND SUBSURFACE RUNOFF ON SURFACE MINE SPOILS IN THE ROCKY MOUNTAIN REGION. THIS OBJECTIVE WILL BE ACCOMPLISHED BY MODIFYING AND INTERFACING EXISTING MODELS OF SUBSURFACE CHEMICAL TRANSPORT. CERTAIN GEOCHEMICAL REACTIONS, OVERLAND FLOW ON INFILTRATING SURFACES, AND SEDIMENT TRANSPORT.

A CURRENT STUDY HAS IDENTIFIED THE IMPORTANT PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE SPOILS WHICH MUST BE INCLUDED IN THE MODEL. THE ADEQUACY OF THE MODEL WILL BE THOROUGHLY TESTED ON FIELD PLOTS LOCATED ON COAL MINE SPOILS IN COLORADO. THE MODEL WILL BE USED TO ANALYZE AND COMPARE ALTERNATIVES IN MINING AND RECLAMATION MANAGEMENT.

AMONG THE ALTERNATIVES TO BE INVESTIGATED ARE THE EFFECTS OF SELECTIVE PLACEMENT OF TOXIC SPOILS, TOPSOILING, SURFACE MANIPULATION TO INCREASE OR DECREASE INFILTRATION, AND THE EFFECT OF REVEGETATION ON POLLUTION POTENTIAL.

00000097

PROJECT TITLE:
RECONNAISSANCE TECHNIQUES FOR EVALUATION OF REHABILITATION POTENTIAL OF ENERGY RESOURCE LANDS

PROJECT NUMBER:
CR 00-104

INVESTIGATORS:
LYNN M. SHOWN

PROJECT SUPERVISOR:
RICHARD HADLEY - REGIONAL HYDROLOGIST
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
BLDG. 25, DENVER FEDERAL CENTER
LAKEWOOD, CO 80225
303-234-3661

PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION.
U.S. BUREAU OF LAND MANAGEMENT
EMRIA

PRIMARY FUNDING AMOUNT:
THROUGH FY 77 - 421,819

TIME FRAME:
07 01 74 TO 06 01 79

LOCATION:
MT WY

ABSTRACT:

PROBLEM: HYDROLOGIC INFORMATION WITH RESPECT TO REHABILITATION POTENTIAL IS NEEDED BY LOCAL, STATE AND FEDERAL GOVERNMENTS, PRIVATE LANDOWNERS, ENERGY COMPANIES AND OTHERS PRIOR TO DECISIONS ON THE LEASING MINING PLANS, AND MINING OF PUBLICLY OWNED COAL AND OIL SHALE. THE INFORMATION IS NEEDED OVER THE NEXT ONE TO FIVE YEARS, SO RECONNAISSANCE TECHNIQUES MUST BE USED TO OBTAIN MUCH OF THE NECESSARY DATA.

THE TWO FACETS OF THE PROBLEM ARE:
1. TO DEFINE THE BASELINE CONDITIONS AS THEY EXIST PRIOR TO MINING MOSTLY IN AREAS HAVING SPARSE HYDROLOGIC DATA, AND
2. TO ASSESS THE POTENTIAL FOR REHABILITATION OF THE LAND-WATER SYSTEM AFTER MINING.

OBJECTIVES: THE PURPOSE OF THIS PROJECT WILL BE TO REFINE AND APPLY RECONNAISSANCE TEHCNIQUES THAT WILL PROVIDE MAPABLE AND OTHER EASILY ASSIMILATED INFORMATION TO BE USED AS BASELINE DATA AND IN EVALUATING

THE REHABILITATION POTENTIAL OF LANDS WHERE ENERGY RESOURCE MINING IS PROPOSED.

DATA WILL BE COLLECTED AND INTERPRETED FOR THE FOLLOWING SUBJECTS: MEAN ANNUAL RUNOFF, 2-, 5- AND 10-YEAR PEAK FLOWS, SOIL ERODIBILITY, ANNUAL SEDIMENT YIELDS, SOIL-VEGETATION-WATER ASSOCIATIONS, EVAPOTRANSPIRATION, SLOPE AND EXPOSURE EFFECTS ON VEGETATION AND HYDROLOGY, RECONSTRUCTION OF TOPOGRAPHY AFTER ASSUMED MINING, AND CHANNEL AND HILLSLOPE EROSION.

APPROACH: THE TEHCNIQUES TO BE USED TO CHARACTERIZE WATERSHEDS OF VARIOUS SIZES ARE:
1. SOIL-MOISTURE STORAGE ASSOCITED WITH VEGETATION TYPES;
2. ESTIMATES OF ANNUAL RUNOFF BY SUBTRACTING SOIL-MOISTURE STORAGE FROM ANNUAL PRECIPITATION;
3. THE RELATION OF PERCENT BARE SOIL TO RUNOFF AND SEDIMENT YIELD;
4. INDEX OF ERODIBILITY BY WATER DISPERSION;
5. ESTIMATES OF ANNUAL RUNOFF AND PEAK DISCHARGES USING CHANNEL MEASUREMENTS;
6. ESTIMATES OF SEDIMENT YIELD USING CLIMATE, DRAINAGE BASIN CHARACTERISTICS AND RESERVOIR SEDIMENT SURVEYS;
7. EROSION MONITORING BY RE-SURVEYING MONUMENTED TRANSECTS;
8. HILLSLOPE, CHANNEL AND GEOLOGIC CROSS-SECTION ANALYSIS WITH RESPECT TO RECONSTRUCTION OF THE TOPOGRAPHY OF POTENTIAL MINE AREAS. SOILS, VEGETATION AND RUNOFF AND EROSION OF NEARBY MINE SPOILS WILL BE INVESTIGATED.

00000098

PROJECT TITLE:
GROUND WATER IN THE MADISON GROUP IN EASTERN MONTANA

PROJECT NUMBER:
MT 73-042C

INVESTIGATORS:
WILLIAM R. MILLER

PROJECT SUPERVISOR:
GEORGE M. PIKE
DISTRICT CHIEF
P.O. BOX 1696
421 FEDERAL BUILDING
316 N. PARK
HELENA, MT 59601
406-442-9040

PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
MONTANA BUREAU OF MINES & GEOLOGY

PRIMARY FUNDING AMOUNT:
51,700

TIME FRAME:
07 01 72 TO 06 01 76

LOCATION:
MT

ABSTRACT:

STRIPPABLE COAL RESERVES IN EASTERN MONTANA EXCEED 20 BILLION TONS. WATER IS NECESSARY TO MINE AND UTILIZE THE COAL. SURFACE WATER IS IN SHORT SUPPLY AND THE ULTIMATE DEVELOPMENT OF COAL WILL DEPEND ON IMPORTED SURFACE WATER AND GROUND WATER. PRELIMINARY ANALYSES OF OIL-TEST DATA INDICATE THE MADISON GROUP MAY BE CAPABLE OF YIELDING MORE THAN 2 CFS OF FAIR QUALITY WATER TO WELLS IN SOME PLACES; HOWEVER, MORE STUDY IS NEEDED TO DELIMIT THE AREAS, DEVELOP A CONCEPTUAL MODEL, DEFINE THE WATER-BEARING CHARACTERISTICS, DESCRIBE THE HYDROLOGIC BOUNDARIES, AND TO PREDICT THE CONSEQUENCES OF DEVELOPMENT OF THE AQUIFER.

OBJECTIVE. THIS PROJECT IS ENVIRIONED AS ONE OF THE FIRST STEPS TOWARD THE EVENTUAL COMPLETE STUDY OF THE MADISON GROUP. THE IMMEDIATE OBJECTIVES ARE TO DEVELOP A CONCEPTUAL MODEL OF THE AQUIFER, DEFINE AREAS HAVING THE BEST QUALITY WATER, ATTEMPT TO EVALUATE THE WATER-BEARING CHARACTERISTICS FROM GEOPHYSICAL LOGS AND DRILL-STEM TEST DATA, AND CATALOGUE THE SOURCES WHERE DATA DESCRIBING THE AQUIFER ARE AVAILABLE.

APPROACH: UTILIZE EXISTING STUDIES AND DATA COMPILATIONS SUPPLEMENTED BY STUDY OF THE OUTCROPS TO DEVELOP A CONCEPTUAL MODEL OF THE AQUIFER. CATALOGUE THE

AVAILABLE SOURCES OF DATA AND OBTAIN SELECTED DATA. OBTAIN CONSULTING HELP TO DETERMINE THE BEST METHODS TO EVALUATE THE WATER-BEARING CHARACTERISTICS OF THE AQUIFER FROM BEOPHYSICAL DATA AND DRILL-STEM TESTS. FROM EVALUATIONS OF SELECTED DATA COMPILE MAPS SHOWING MAPS SHOWING QUALITY OF WATER VARIATIONS, POTENTIOMETRIC SURFACE, AND WATER-BEARING CHARACTERISTICS.

00000099

PROJECT TITLE:
GROUND WATER IN THE FORT UNION FORMATION NEAR POTENTIAL STRIP-MINES IN MONTANA

PROJECT NUMBER:
MT 73-043C

INVESTIGATORS:
WILLIAM B. HOPKINS

PROJECT SUPERVISOR:
GEORGE M. PIKE
DISTRICT CHIEF
P.O. BOX 1696, 421 FEDERAL BLDG.
316 N. PARK
HELENA, MT 59601
406-442-9040

PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
MONTANA BUREAU OF MINES & GEOLOGY
MONTANA DEPT. OF NATURAL RESOURCES & CONSERVATION

PRIMARY FUNDING AMOUNT: FY 75 - 47,490

TIME FRAME:
07 01 72 - CONTINUING

LOCATION:
MT

ABSTRACT:
PROBLEM: STRIP MINING OF COAL IN THE FORT UNION FORMATION IN EASTERN MONTANA IS INCREASING. AVAILABLE HYDROLOGIC INFORMATION IS NOT ADEQUATE TO DESCRIBE GROUNDWATER CONDITIONS IN THE POTENTIAL MINE AREAS. GROUND WATER IN THE FORT UNION NEEDS TO BE DESCRIBED IN ORDER TO PREDICT AND EVALUATE CHANGES TO THE HYDROLOGIC ENVIRONMENT THAT MAY OCCUR AS A RESULT OF MINING AND SUBSEQUENT LAND RECLAMATION.

OBJECTIVES:
TO COLLECT AND COMPILE DATA TO DESCRIBE GROUND WATER CONDITIONS BEFORE AND AFTER MINING AND TO DESCRIBE THE RELATIONS BETWEEN SURFACE AND GROUND WATER IN THE FORT UNION FORMATION. ALSO, ESTABLISH AN OBSERVATION WELL NETWORK TO DETECT WATER-LEVEL AND QUALITY OF WATER CHANGES WITH TIME, BOTH IN RECLAIMED AND UNMINED AREAS.

APPROACH: INVENTORY SELECTED WELLS IN AND NEAR STRIP MINING AREAS AND POTENTIAL STRIP MINING AREAS. MEASURE YIELDS OF SPRINGS, MAKE MISCELLANEOUS STREAMFLOW MEASUREMENTS, AND SAMPLE CHEMICAL QUALITY OF WATER FROM WELLS, SPRINGS AND STREAMS DURING THE LOW FLOW PERIOD. MAKE AQUIFER TESTS ON SELECTED WELLS. MUCH DATA FROM THE BUREAU OF LAND MANAGEMENT AND THE U.S. FOREST SERVICE WILL BE EVALUATED AND SELECTED DATA FIELD CHECKED AND COMPILED. COMPILE THE RESULTS OF FIELD WORK INTO MAPS AND CHARTS DESCRIBING THE GROUND WATER RESOURCES.

00000100

PROJECT TITLE:
EFFECTS OF MINING AND RELATED ACTIVITIES ON THE SHALLOW GROUND WATER SYSTEM

PROJECT NUMBER:
MT 75-048

INVESTIGATORS:
ROBERT S. ROBERTS

PROJECT SUPERVISOR:
GEORGE M. PIKE
DISTRICT CHIEF
P.O. BOX 1696, 421 FEDERAL BLDG.

316 N. PARK
HELENA, MT 59601
406-442-9040

PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

PRIMARY FUNDING AMOUNT:
THROUGH FY 77 - 934,970

TIME FRAME:
07 01 74 TO 06 01 79

LOCATION:
MT

ABSTRACT:
STRIP MINING AND THE RELATED ASPECTS OF COAL DEVELOPMENT CAN BE EXPECTED TO CAUSE GROUND WATER LEVELS AND GROUND WATER QUALTIY TO CHANGE. THE PUBLIC, INDUSTRY, AND GOVERNMENT NEED TO KNOW THE EXTENT OF OF CHANGE IN ORDER TO TAKE AND ENFORCE MITIGATING MEASURES. WATER AVAILABILITY AND WATER QUALITY NEED TO BE KNOWN IN ORDER FOR OTHER AGENCIES TO EVALUATE ALTERNATE SOURCES OF WATER.

OBJECTIVES:
DEFINE AND UNDERSTAND THE REGIONAL AND LOCAL FLOW SYSTEMS IN AQUIFERS ABOVE THE PIERRE SHALE. DEVELOP A SEMI-QUANTITATIVE CONCEPTUAL MODEL AS A BASIS FOR PREDICTIVE MODELS. DEVELOP PREDICTIVE MODELS TO ASSESS THE EFFECTS OF MINING ON WATER LEVELS AND THE YIELD OF WELLS AND SPRINGS. DEVELOP "FIRST ESTIMATE" WATER QUALITY MODELS TO PREDICT RATE AND DIRECTION OF MOVEMENT OF POOR QUALITY WATER FROM SPOIL BANKS AND OTHER SOURCES. UTILIZE ALL OF THE MODELS TO EVALUATE AND REVISE THE DATA COLLECTION PROGRAM. ASSURE THAT THE DATA COLLECTION AND INTERPRETATION (MODELING) PROGRAMS MEET THE NEEDS OF OTHER FEDERAL AND STATE AGENCIES.

APPROACH:
COMBINE THE ACCUMULATED GEOLOGIC AND HYDROLOGIC INFORMATION TO DEVELOP CONCEPTUAL MODELS OF THE HYDROLOGIC SYSTEM ON BOTH LARGE AND SMALL SCALES. COLLECT ADDITIONAL DATA NEEDED FOR MORE COMPLETE UNDERSTANDING OF THE HYDROLOGIC SYSTEM. DEVELOP DIGITAL MODELS, FIRST, TO TEST AND MODIFY THE CONCEPTS AND EVALUATE THE DATA COLLECTION NETWORK THEN TO PREDICT THE EFFECTS OF MINING AND RELATED ACTIVITIES ON GROUND WATER LEVELS AND THE DISCHARGE OF SPRINGS. USING THE HYDRAULIC MODELS, TRY TO DEVELOP WATER QUALITY MODELS TO DETERMINE OR PREDICT LEACHATE MIGRATION AND THE MOVEMENT OF OTHER POOR QUALITY WATER.

00000101

PROJECT TITLE:
AVAILABILITY OF WATER FROM THE MADISON AND ASSOCIATED LIMESTONES IN THE POWDER RIVER BASIN

PROJECT NUMBER:
MT 75-029

INVESTIGATORS:
W. ROGER MILLER

PROJECT SUPERVISOR:
GEORGE M. PIKE
DISTRICT CHIEF
P.O. BOX 1696, 421 FEDERAL BLDG.
316 N. PARK
HELENA, MT 59601
406-442-9040

PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY, WATER RESOURCES DIV.
MONTANA BUREAU OF MINES & GEOLOGY

PRIMARY FUNDING AMOUNT:
34,500

TIME FRAME:
07 01 74 TO 10 01 75

LOCATION:
MT

ABSTRACT:
LARGE WATER SUPPLIES ARE NEEDED FOR ENERGY DEVELOPMENT

IN THE POWDER RIVER BASIN. THE MADISON AQUIFER MAY BE CAPABLE OF SUPPLYING 2-5 CFS VIA WELLS, BUT THE INFORMATION IS INADEQUATE TO PREDICT WHERE AND HOW MUCH THE AQUIFER WILL YIELD OR WHAT WILL BE THE EFFECTS OF DEVELOPMENT. THE AQUIFER IS DEEPLY BURIED AND TEST DRILLING AND OTHER TESTING WILL BE EXPENSIVE. SO LITTLE IS KNOWN ABOUT THE MADISON THAT AT THIS TIME LOGICAL PLANS CANNOT BE MADE TO TEST AND EVALUATE THE AQUIFER.

OBJECTIVE:
EVALUATE THE DATA DESCRIBING THE AQUIFER TO IMPROVE THE CONCEPTUAL MODEL. TEST THE MODEL TO REFINE THE CONCEPTS AND DEVELOP A RELIABLE UNDERSTANDING OF THE AQUIFER. FROM THIS KNOWLEDGE PLAN A DRILLING AND TESTING PROGRAM OF THE MADISON AQUIFER FOR FISCAL YEARS 1976 AND BEYOND.

APPROACH:
PREDICT THE CONSEQUENCES THAT FOLLOW FROM THE PRESENTLY HELD CONCEPTS OF THE AQUIFER. UTILIZE THE EXISTING DATA TO DETERMINE THE VALIDITY OF THE CONSEQUENCES AND MODIFY THE CONCEPTS ACCORDINGLY. EVALUATE THE GEOLOGIC, GEOPHYSICAL, AND HYDROLOGIC TECHNIQUES FOR OBTAINING AND EXTENDING DATA. DETERMINE THOSE TECHNIQUES THAT APPEAR TO BE THE MOST USEFUL FOR A MAJOR STUDY. MERGE THE CONCEPTS WITH THE SELECTED TECHNIQUES TO DEVELOP A PLAN TO MAKE A MAJOR STUDY OF THE MADISON AQUIFER IN FY76 AND BEYOND.

00000102

PROJECT TITLE:
SITE STUDY TO ASSESS THE GROUND WATER PROBLEMS THAT MAY AFFECT RESTORATION OF MINED LANDS

PROJECT NUMBER:
MT 75-050

INVESTIGATORS:
WILLIAM R. HOTCHKISS

PROJECT SUPERVISOR:
GEORGE M. PIKE
DISTRICT CHIEF
P.O. BOX 1696, 421 FEDERAL BUILDING
316 N. PARK
HELENA, MT 59601
406-442-9040

PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
U.S. BUREAU OF LAND MANAGEMENT
EMRIA

PRIMARY FUNDING AMOUNT:
44,040

TIME FRAME:
07 01 74 TO 06 01 75

LOCATION:
MT

ABSTRACT:

PROBLEM:
BEFORE COAL IS PUT UP FOR LEASE THE WATER PROBLEMS THAT MAY BE ASSOCIATED WITH MINING AND RECLAMATION NEED TO BE KNOWN FOR EACH SITE PROPOSED FOR MINING. THE EXTENT AND DEGREE OF THE WATER PROBLEMS WILL BE IMPORTANT FACTORS IN SELECTING THE SITES THAT WILL BE MADE AVAILABLE FOR LEASING.

OBJECTIVE:
PROVIDE THE DATA AND INTERPRETATIONS NECESSARY TO DEFINE THE WATER PROBLEMS THAT MAY BE IMPORTANT DURING MINING AND RECLAMATION AND SUFFEST ALTERNATE SOLUTIONS TO THEM. DESIGN A MONITORING SYSTEM TO DEFINE BASELINE CONDITIONS AND DOCUMENT CHANGES IN GROUND WATER FLOW AND QUALITY ASSOCIATED WITH MINING AND RECLAMATION. DEVELOP TECHNIQUES AND PROCEDURES THAT WILL AID IN PERFORMING FUTURE STUDIES OF THIS TYPE.

APPROACH:
IN CONJUNCTION WITH USBR, BLM, AND OTHER DIVISIONS OF THE USGS, DRILL TEST HOLES, COMPILE AND INTERPRET GEOLOGIC, HYDROLOGIC, AND GEOPHYSICAL DATA TO DESCRIBE THE HYDROLOGIC SYSTEM AND PREDICT THE PROBLEMS. DEVELOP DIGITAL MODELS TO RELATE CAUSES AND EFFECTS

AND TO MAKE QUANTITATIVE PREDICTIONS OF WATER LEVEL CHANGES AS WELL AS CHANGES IN FLOW OF SPRINGS. WRITE A REPORT DESCRIBING THE HYDROLOGIC SYSTEM, PREDICTING PROBLEMS AND MITIGATING MEASURES, AND DESCRIBING THE MONITORING SYSTEM.

00000103

PROJECT TITLE:
HYDROLOGIC CHANGES DUE TO LIGNITE MINING IN NORTH DAKOTA: PART I - RECONNAISSANCE OF STRIPPABLE LIGNITE DEPOSITS

PROJECT NUMBER:
ND 75-070

INVESTIGATORS:
ORLO A. CROSBY

PROJECT SUPERVISOR:
WALTER R. SCOTT, DISTRIC CHIEF
P.O. BOX 778, ROOM 332, NEW FEDERAL BLDG.
THIRD ST. AND ROSSER AVE.
BISMARCK, ND 58501
701-255-4011

PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISON

PRIMARY FUNDING AMOUNT:
170,000

TIME FRAME:
07 01 74 TO 06 01 76

LOCATION:
ND

ABSTRACT:
PROBLEM:

THERE IS A LACK OF RELIABLE AND DETAILED GEOLOGIC AND HYDROLOGIC DATA FOR THE ASSESSMENT OF THE HYDROLOGIC EFFECTS OF STRIP MINING THE LIGNITE COAL IN NORTH DAKOTA. THE MINING WILL, IN SOME AREAS, AFFECT THE AVAILABILITY OF WATER FOR SHALLOW WELLS. THE QUALITY OF WATER WILL BE CHANGED THROUGH DISPLACEMENT AND MIXING OF OVERBURDENED MATERIALS. SEDIMENT YIELDS FROM THE AREAS WILL BE CHANGED. THE GROUND WATER INTERRELATIONSHIP WITH SURFACE WATER WILL BE ALTERED. NONE OF THESE EFFECTS CAN BE EVALUATED WITHOUT A THOROUGH KNOWLEDGE OF PRESENT HYDROLOGIC CONDITIONS.

OBJECTIVES: THE PROJECT OBJECTIVES ARE TO DEFINE FOR EACH STRIPPABLE LIGNITE DEPOSIT (AS IDENTIFIED IN PUBLICATIONS OF THE U.S. BUREAU OF MINES AND THE U.S. GEOLOGICAL SURVEY) THE FOLLOWING INFORMATION:
1. A SUMMARY OF LOCAL GEOLOGIC CONDITIONS;
2. DESCRIPTION OF THE LOCAL GROUND WATER FLOW SYSTEM;
3. FLOW CHARACTERISTICS OF THE STREAMS
4. CHEMICAL QUALITY OF WATER FROM STREAMS, LAKES, AQUIFERS;
5. STREAM SEDIMENT LOADS, AND
6. RECOMMENDATIONS FOR MORE INTENSIVE HYDROLOGIC STUDIES IN PROBABLE PROBLEM AREAS.

APPROACH: A FIELD RECONNAISSANCE WILL BE MADE TO EVALUATE THE DEPOSIT AREAS IN REGARD TO GEOLOGY, TOPOGRAPHY AND LAND USE. A LITERATURE AND DATA SEARCH WILL BE MADE AND ALL HYDROLOGIC AND GEOLOGIC DATA COMPUTERIZED. CONCEPTUAL MODELS WILL BE DEVELOPED FOR EACH SITE THROUGH PRELIMINARY ANALYSIS AND INTERPRETATION OF AVAILABLE DATA. ADDITIONAL DATA NEEDS WILL BE DEFINED AND A PROGRAM OF DATA COLLECTION INSTITUTED. THESE DATA WILL THEN BE USED TO FURTHER DEVELOP AND TEST THE CONCEPUTAL MODELS. THE PROBABLE HYDROLOGIC CHANGES DUE TO MINING WILL BE EVALUATED FOR EACH DEPOSIT AND RECOMMENDATIONS FOR AREAS OF FUTURE INTENSIVE HYDROLOGIC STUDY WILL BE MADE.

00000104

PROJECT TITLE:
AVAILABILITY OF GROUND WATER FROM AQUIFERS IN THE CRETACEOUS AND TERTIARY SYSTEMS IN THE FORT UNION COAL REGION

PROJECT NUMBER:
ND 75-071

1.3 WATER RESOURCES

INVESTIGATORS:
MACK G. CROFT

PROJECT SUPERVISOR:
WALTER R. SCOTT, DISTRICT CHIEF
P.O. BOX 778, ROOM 332, NEW FEDERAL BLDG.
THIRD ST AND ROSSER AVE.
BISMARCK, ND 58501
701-255-4011

PRIMARY SPONSOR:
U.S. GEOLOGIC SURVEY
WATER RESOURCES DIVISION

PRIMARY FUNDING AMOUNT:
70,000

TIME FRAME:
07 01 74 TO 06 01 76

LOCATION:
ND MT SD WY

ABSTRACT:

PROBLEM: PROPOSED COAL DEVELOPMENTS IN THE FORT UNION COAL REGION OF THE NORTHERN PLAINS WILL BE ATTENDED BY SUBSTANTIAL INCREASES IN WATER USAGE. IN MUCH OF THE REGION, THE ONLY PRACTICAL SOURCE OF WATER FOR DOMESTIC, STOCK, MUNICIPAL, AND SMALL SCALE INDUSTRIAL REQUIREMENTS IS GOURND WATER FROM RELATIVELY SHALLOW AQUIFERS IN ROCKS OF CRETACEOUS AND TERTIARY AGE. HOWEVER, KNOWLEDGE OF THESE AQUIFERS IS FRAGMENTAL AND LIMITED TO SCATTERED LOCALITIES. A SYSTEMATIC AND REGIONAL APPRAISAL IS REQUIRED FOR PLANNING, DEVELOPMENT, AND MANAGEMENT PURPOSES.

OBJECTIVES: THE MAJOR OBJECTIVES ARE:
1. TO DETERMINE THE LOCATION, EXTENS, AND NATURE OF THE MAJOR AQUIFERS AND CONFINING BEDS IN THE CRETACEOUS AND TERTIARY SYSTEMS IN THE FORT UNION COAL REGION;
2. TO EVALUATE THE OCCURRENCE, MOVEMENT, AND AVAILABILITY OF GROUND WATER, INCLUDING SOURCES OF RECHARGE AND DISCHARGE; AND
3. DETERMINE THE CHEMICAL QUALITY OF THE GROUND WATER.

APPROACH: THE INVESTIGATION WILL BE CONCERNED MAINLY WITH THE COMPILATION, ANALYSIS, AND INTERPRETATIONS OF EXISTING PERTINENT DATA FROM AVAILABEL SOURCES IN SOURCES IN THE STATES OF NORTH DAKOTA, SOUTH DAKOTA, WYOMING, AND MONTANA. MAJOR AQUIFERS IN THE CRETACEOUS AND TERTIARY SYSTEMS WILL BE IDENTIFIED, DESCRIBED, AND CORRELATED MAINLY THROUGH THE USE OF GEOPHYSICAL AND LITHOLOGIC LOGS. THREE REGIONAL HYDROGEOLOGIC SECTIONS WILL BE PREPARED THAT WILL ILLUSTRATE THE STRUCTURAL AND STRATIGRAPHIC RELATIONSHIPS OF THE MAJOR AQUIFERS. A STRUCTURAL MAP WILL BE PREPARED, USING THE TOP OF THE PIERRE FORMATION WHICH, FOR MUCH OF THE REGION, ALSO WILL REPRESENT THE LOWER LIMIT OF POTABLE GROUND WATER. THE FINAL REPORT WILL BE PREPARED IN THE PROFESSIONAL PAPER OR WATER RESOURCES INVESTIGATION SERIES.

00000105

PROJECT TITLE:
MEASUREMENT OF WATER LOSSES TO THE MADISON LIMESTONE AND ASSOCIATED ROCKS FROM STREAMS IN NORTHEASTERN WYOMING

PROJECT NUMBER:
WY 75-028

INVESTIGATORS:
FRED C. BONER

PROJECT SUPERVISOR:
SAMUEL W. WEST, DISTRICT CHIEF
P.O. BOX 2087
4015 WARREN AVE.
CHEYENNE, WY 82001
307-778-2220

PRIMARY SPONSOR:
WYOMING STATE ENGINEER

PRIMARY FUNDING AMOUNT:
260,000

TIME FRAME:
07 01 74 TO 06 01 76

LOCATION:
WY

ABSTRACT:

PROBLEM:
EXTENSIVE DEVELOPMENT OF WYOMING'S COAL RESOURCES

INCLUDES THE NEED FOR LARGE SUPPLIES OF WATER. BECAUSE NORTHEASTERN WYOMING HAS INSUFFICIENT SURFACE WATER FOR SUCH DEVELOPMENT, GROUND WATER IS BEING CONSIDERED AS A POSSIBLE SUPPLEMENTARY SOURCE. THE MADISON LIMESTONE HAS GREAT POTENTIAL, BUT KNOWLEDGE OF THE CAPACITY OF THE MADISON TO FILL THIS NEED IS INADEQUATE. THIS PROJECT IS SPECIFICALLY DIRECTED AT THE LACK OF INFORMATION ABOUT RECHARGE TO THE MADISON BY STREAMS WHICH CROSS THE OUTCROP AREAS IN THE BIG HORN MOUNTAINS, BLACK HILLS, AND NORTHERN LARAMIE RANGE.

OBJECTIVE:
THIS IS PRIMARILY A BASIC DATA COLLECTION PROJECT, THE OBJECTIVES OF WHICH ARE:
1. DETERMINATION OF THE MAGNITUDE AND AREAL DISTRIBUTION OF LOSSES TO THE MADISON BY STREAMS WHICH CROSS THE OUTCROP AREA;
2. DETERMINATION OF PRECIPITATION, RUNOFF, INFILTRATION RELATIONSHIPS IN OUTCROP AREAS; AND
3. ESTABLISHMENT OF BASELINE STREAMFLOW CONDITIONS PRIOR TO POSSIBLE INCREASED DEVELOPMENT OF MADISON LIMESTONE WATER.

APPROACH:
1. MAKE A FIELO SURVEY OF THE GEOLOGIC AND HYDROLOGIC CONDITIONS OF ALL PERENNIAL STREAMS CROSSING MADISON OUTCROPS;
2. OPERATE 32 NEW AND 5 EXISTING GAGING STATIONS AT SITES ABOVE AND BELOW THE OUTCROP;
3. MAKE 3 SETS OF STREAMFLOW MEASUREMENTS EACH YEAR ON 30 ADDITIONAL STREAMS AT SITES ABOVE AND BELOW THE OUTCROP;
4. COLLECT PRECIPITATION DATA (STORAGE GAGES) NEAR SOME STREAMFLOW SITES;
5. ESTIMATE MEAN ANNUAL DISCHARGE AT ALL SITES BY CHANNEL GEOMETRY TECHNIQUES;
6. ANALYZE THE PRECIPITATION AND STREAMFLOW DATA TO DETERMINE SHORT TERM LOSSES FROM STREAMS TO THE MADISON LIMESTONE, AND TO DESIGN A POST-PROJECT MONITORING PROGRAM.

00000106

PROJECT TITLE:
WATER AND ITS RELATION TO ECONOMIC DEVELOPMENT IN THE GREEN RIVER AND GREAT DIVIDE BASINS IN WYOMING

PROJECT NUMBER:
WY 75-030

INVESTIGATORS:
HUGH W. LOWHAM

PROJECT SUPERVISOR:
SAMUEL W. WEST
DISTRICT CHIEF
P.O. BOX 2087
4015 WARREN AVE.
CHEYENNE, WY 82001
307-778-2220

PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
U.S. BUREAU OF LAND MANAGEMENT,
EMRIA

PRIMARY FUNDING AMOUNT:
THROUGH FY 77 - 651,000

TIME FRAME:
11 01 74 TO 09 01 79

LOCATION:
WY

ABSTRACT:
PROBLEM: DEVELOPMENT OF EXTENSIVE COAL, OIL, GAS, TRONA, AND OIL SHALE RESOURCES IN THE PROJECT AREA WILL REQUIRE A PROJECTED INCREASE IN WATER CONSUMPTION OF 480,000 ACRE FEET PER YEAR BY 1990. DEVELOPMENT OF ENERGY RESOURCES IN OTHER PARTS OF THE STATE ALSO WILL REQUIRE LARGE AMOUNTS OF WATER; TRANSBASIN DIVERSION OF GREEN RIVER WATER TO OTHER AREAS COULD TOTAL AN

ADDITIONAL 270,000 ACRE FEET PER YEAR. WATER PLANNERS AND MANAGERS NEED MUCH MORE INFORMATION ABOUT AVAILABLE GROUND AND SURFACE WATER, PRESENT QUALITY OF THE WATERS, AND THE IMPACTS ON WATER SUPPLY AND QUALITY CAUSED BY DEVELOPMENT OF ENERGY RESOURCES.

OBJECTIVES:
THE STUDY WILL BE DESIGNED TO GATHER INFORMATION, AND MAKE AVAILABLE TO INTERESTED INDUSTRIAL, AGRICULTURAL, AND GOVERNMENTAL PEOPLE, INTERPRETIVE REPORTS THAT DESCRIBE:
1. THE DISTRIBUTION AND QUALITY OF SURFACE WATER IN SPACE AND TIME;
2. RELATIONSHIPS BETWEEN GROUND AND SURFACE WATER;
3. THE DISTRIBUTION, QUANTITY, AND QUALITY OF GROUND WATER, AND
4. HYDROLOGY-RELATED ASPECTS OF THE ENVIRONMENT.
EFFORTS OF THE STUDY WILL BE DIRECTED TOWARDS:
1. DESCRIBING THE WATER RESOURCES AND HYDROLOGIC RELATIONSHIPS THAT PRESENTLY EXIST,
2. DEVELOPING PREDICTIVE METHODS THAT MAY BE USED TO DESCRIBE FURTHER CONDITIONS, INCLUDING REACTIONS TO INCREASED WATER DEVELOPMENT, AND
3. ESTABLISHING MONITORING PROGRAMS FOR DETECTING POSSIBLE CHANGES IN WATER PARAMETERS.

APPROACHES: COMPILE AND EVALUATE EXISTING WATER DATA. CONDUCT LITERATURE SEARCH FOR PRESENT HYDROLOGIC KNOWLEDGE OF THE AREA. PREPARE PLANNING REPORT DURING FIRST YEAR OF PROJECT, OUTLINING THE SPECIFIC TECHNIQUES TO BE USED IN SUBSEQUENT PHASES. REGARDING WATER QUALITY, PARTICULAR ATTENTION WILL BE GIVEN TO TRACE METALS, BIOLOBICAL PARAMETERS, AND TREND ANALYSIS. CHANNEL GEOMETRY TECHNIQUES, ERTS IMAGERY, AND DETAILED STATISTICAL ANALYSES WILL BE APPLIED TO SURFACE WATER STUDIES. AQUIFER TESTS AND BORE HOLE AND SURFACE GEOPHYSICAL SURVEYS WILL BE USED IN GROUND WATER STUDIES. DIGITAL MODELS WILL BE DEVELOPED FOR CHEMICAL QUALITY AND SURFACE WATER SYSTEMS.

00000107

PROJECT TITLE:
IMPACTS OF ECONOMIC DEVELOPMENT AND WATER USE ON WATER RESOURCES IN THE HANNA BASIN IN WYOMING

PROJECT NUMBER:
WY 75-031

INVESTIGATORS:
PETER DYER, KATHY DYER

PROJECT SUPERVISOR:
SAMUEL W. WEST, DISTRICT CHIEF
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
P.O. BOX 2087
4015 WARREN AVE.
CHEYENNE, WY 82001
307-778-2220

PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIV.
U.S. BUREAU OF LAND MANAGEMENT
EMRIA

PRIMARY FUNDING AMOUNT:
THROUGH FY 77 - 144,500

TIME FRAME:
07 01 74 TO 09 01 78

LOCATION:
WY

ABSTRACT:
PROBLEM:THE HANNA BASIN HAS OVER 22,000 ACRES OF LAND LEASED FOR COAL MINING. OIL AND NATURAL GAS DEVELOPMENT IS VERY LIKELY TO EXPAND IN THE FUTURE. MINING, SOME OF WHICH WILL BE IN WATER-SATURATED COAL BEDS, AND OIL AND NATURAL GAS DRILLING WILL APPLY NEW STRESSES ON THE HYDROLOGIC ENVIRONMENT AND MANY NEW DEMANDS. THE BUREAU OF LAND MANAGEMENT IS CONCERNED ABOUT THE EFFECT MINING WILL HAVE ON THE WATER RESOURCES OF THE BASIN AND THE AVAILABILITY OF WATER FOR RECLAMATION. THE BUREAU OF MINES NEEDS INFORMATION ON HOW AN IN SITU COAL GASIFICATION EXPERIMENT IT IS CONDUCTING INTERACTS WITH GROUND WATER.

OBJECTIVES: THE OBJECTIVES OF THE PROJECT ARE TO DESCRIBE THE PRESENT CHARACTERISTICS OF THE HYDROLOGIC

ENVIRONMENT, TO MONITOR CHANGES IN IT, AND TO EVALUATE THE EFFECTS OF THOSE CHANGES. ON THE SURFACE, PEAK AND ANNUAL FLOWS, CHANNEL GEOMETRY, SEDIMENTATION RATES, EROSION RATES, USES, AND QUALITY OF WATER WILL BE INVESTIGATED. IN THE SUBSURFACE, AQUIFER CHARACTERISTICS, GROUND WATER USES, AND PUMPING AMOUNTS WILL BE ESTIMATED.

APPROACH: 1. DESCRIBE STREAMFLOW CONDITIONS, EVALUATE PAST RECORDS, ESTABLISH TWO NEW GAGING SITES FOR FLOW MEASUREMENTS, SEDIMENT SAMPLING, AND CHEMICAL QUALITY; USE CHANNEL GEOMETRY METHODS WHERE NECESSARY.
2. DEFINE AQUIFER CHARACTERISTICS, PERFORM AQUIFER TESTS, DRAW POTENTIOMETRIC MAPS, ANALYZE WATER QUALITY, IDENTIFY RECHARGE AND DISCHARGE AREAS.

0000108

ROJECT TITLE:
WATER RESOURCES OF THE POWDER RIVER STRUCTURAL BASIN IN WYOMING IN RELATION TO ENERGY DEVELOPMENT

ROJECT NUMBER:
WY 75-032

NVESTIGATOR:
MARLIN E. LOWRY

ROJECT SUPERVISOR:
SAMUEL W. WEST, DISTRICT CHIEF
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
P.O. BOX 2087
4015 WARREN AVE.
CHEYENNE, WY 82001
307-778-2220

RIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

RIMARY FUNDING AMOUNT:
THROUGH FY 77 - 1,115,500

TIME FRAME:
11 01 74 TO 09 01 79

LOCATION:
WY

ABSTRACT:
PROBLEM:
THE PROBLEMS ARE THOSE RELATED TO LARGE WATER REQUIREMENTS FOR DEVELOPMENT OF ENERGY RESOURCES IN THE WATER SHORT POWDER RIVER BASIN AND THE IMPACTS RESULTING FROM SUCH DEVELOPMENT. AN AVERAGE ANNUAL REQUIREMENT OF 250,000 ACRE-FEET OF WATER PER YEAR IS PROJECTED BY 1990. PART OF THE INITIAL DEMAND COULD BE SUPPLIED BY SURFACE WATER AND/OR GROUND WATER FROM AQUIFERS OF UPPER CRETACEOUS OR TERTIARY AGE. THE IMPACTS OF MINING, RECLAMATION, TRANSBASIN DIVERSIONS, OFF-CHANNEL AND OTHER RESERVOIRS ON THE SHALLOW AQUIFERS, STREAM SYSTEMS, AND QUALITY OF WATER IS NOT KNOWN.

OBJECTIVE:
THE OBJECTIVES OF THE FIRST PHASE WILL BE TO DETERMINE THE ADEQUACY OF EXISTING DATA TO DESCRIBE WATER AVAILABILITY AND ASSESS POSSIBLE IMPACT OF THE PENDING DEVELOPMENT, AND TO IDENTIFY SPECIFIC SUBJECTS THAT SHOULD BE STUDIED BY THE DISTRICT. THE FINDINGS OF THE FIRST PHASE WILL BE USED TO IDENTIFY MAJOR THRUSTS FOR THE SECOND PHASE, WHICH WILL CONSTITUTE DISTRICT'S PROGRAM IN THE BASIN DURING THE SUCCEEDING FOUR YEARS. A DATA-COLLECTION SYSTEM WILL BE DESIGNED, BASED ON FINDINGS OF THE FIRST PHASE, TO MEET DATA NEEDS FOR THRUSTS AND OBTAIN BENCHMARK INFORMATION.

APPROACH:
THE EXISTING DATA AND DATA-COLLECTION PROGRAM WILL BE EVALUATED AND A DATA-COLLECTION PROGRAM, WHICH IS COORDINATED WITH OTHER GOVERNMENTAL AND INDUSTRIAL PROGRAMS, WILL BE IMPLEMENTED. VARIOUS STUDY TECHNIQUES INCLUDING THOSE FOR DETERMINATION OF AQUIFER PROPERTIES, STREAMFLOW ANALYSIS, CHANNEL GEOMETRY, ISOTOPE STUDY, BIOLOGICAL ASSAY, WATER BUDGETS, MODELING, AND GEOPHYSICS WILL BE EXPLORED AND THOSE THAT HAVE MERIT WILL BE PURSUED IN THE SECOND PHASE OF THE STUDY.

00000109

PROJECT TITLE:
HYDROLOGY OF PALEOZOIC ROCKS IN THE POWDER RIVER BASIN AND ADJACENT AREAS, NORTHEASTERN WYOMING

PROJECT NUMBER:
WY 75-033

INVESTIGATORS:
WARREN G. HODSON

PROJECT SUPERVISOR:
SAMUEL W. WEST, DISTRICT CHIEF
U.S. GEOLOGICAL SURVEY
P.O. BOX 2087
4015 WARREN AVE
CHEYENNE, WY 82001
307-778-2220

PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

PRIMARY FUNDING AMOUNT:
THROUGH FY 77 - 890,000

TIME FRAME:
11 01 74 TO 09 11 79

LOCATION:
WY

ABSTRACT:

PROBLEM: DEVELOPMENT OF ENERGY RESOURCES, ESPECIALLY ENORMOUS COAL DEPOSITS, IN THE POWDER RIVER BASIN WILL REQUIRE A PROJECTED INCREASE OF 250,000 ACRE-FEET OF WATER PER YEAR BY 1990. GROUND WATER IS MORE READILY AVAILABLE, AND WILL BE THE PRINCIPAL SOURCE OF WATER IN THE EARLY YEARS OF DEVELOPMENT UNTIL LARGE-SCALE MULTIPURPOSE WATER PROJECTS ARE COMPLETED. PALEOZOIC - AGE CARBONATE ROCKS, LARGELY UNDEVELOPED, COULD YIELD LARGE QUANTITIES OF WATER. DEVELOPMNET OF LARGE WATER SUPPLIES FROM THE PALEOZOIC ROCKS DEPENDS ON THE PRESENCE OF SECONDARY PERMEABILITY AND ON THE AQUIFER RESPONSE TO PUMPING FROM NEARBY WELLS DEVELOPED IN THE SAME AQUIFER.

OBJECTIVE: THE PROJECT IS DESIGNED TO DERIVE A CONCEPTUAL MODEL OF THE AQUIFER SYSTEM TO BETTER PREDICT THE QUANTITY AND QUALITY OF WATER AVAILABLE FROM THE PALEOZOIC ROCKS AND TO PREDICT SOME OF THE EFFECTS OF ITS DEVELOPMENT. PRINCIPAL OBJECTIVES WILL BE TO DETERMINE:
1) THE DISTRIBUTION, THICKNESS, AND PHYSICAL PROPERTIES OF THE AQUIFER SYSTEM;
2) PROCESSES THAT DEVELOPED THE PRESENT DISTRIBUTION OF AQUIFER PARAMETERS IN ORDER TO EXTEND POINT DATA TO OTHER PARTS OF THE AQUIFER SYSTEM;
3) THE POTENTIOMETRIC SURFACE AND CHEMICAL QUALITY OF THE WATER IN THE AQUIFER SYSTEM; AND
4) THE EFFECTS OF INCREASED DEVELOPMENT OF WATER FROM THE AQUIFER SYSTEM.

APPROACH:
COLLECT AND COMPILE ALL AVAILABLE DATA FOR THE AQUIFER SYSTEM INCLUDING DATA FOR WATER WELLS, OIL AND GAS TESTS THAT PENETRATED THE AQUIFER, AND TESTS, CORES, AND CHEMICAL ANALYSES OF WATER. BOREHOLE AND SURFACE GEOPHYSICAL SURVEYS TO EVALUATE AND CORRELATE THE PHYSICAL CHARACTERISTICS OF THE AQUIFER TO THE WATER-YIELDING PROPERTIES. NATURAL TRACERS TO DETERMINE BOTH THE RATE AND DIRECTION OF FLOW. OBTAIN TEMPERATURE DIFFERENCES WITH DEPTH TO EVALUATE VERTICAL MOVEMENT OF WATER. STREAMFLOW ANALYSIS TO EVALUATE RECHARGE AND UNDERGROUND FLOW REGIME. DIGITAL SIMULATION MODELS TO AID IN INTERPRETING THE AQUIFER SYSTEMS AND TO PREDICT THE RESPONSE TO FUTURE STRESSES.

00000110

PROJECT TITLE:
COLLECTION OF BASIC RECORDS

PROJECT SUPERVISOR:
SAMUEL W. WEST, DISTRICT CHIEF
P.O. BOX 2087
4015 WARREN AVE.
CHEYENNE, WY 82001
307-778-2220

GEORGE M. PIKE , DISTRICT CHIEF
P.O. BOX 1696, 421 FEDERAL BLDG.
316 N. PARK
HELENA, MT 59601
406-442-9040

WALTER R. SCOTT, DISTRICT CHIEF
P.O. BOX 778, ROOM 332

NEW FEDERAL BLDG.
BISMARCK, ND 82001
701-255-4011

PRIMARY SPONSORS:
WYOMING STATE ENGINEER
WYOMING DEPT. OF ECONOMIC PLANNING AND DEVELOPMENT
OLD WEST REGIONAL COMMISSION
WYOMING HIGHWAY DEPT.
U.S. ENVIRONMENTAL PROTECTION AGENCY
WYOMING DEPT. OF AGRICULTURE
WYOMING DEPT. OF ENVIRONMENTAL QUALITY
MONTANA DEPT. OF NATURAL RESOURCES AND CONSERVATION
MONTANA BUREAU OF MINES AND GEOLOGY
MONTANA DEPT OF HIGHWAYS
MONTANA STATE UNIV.
MONTANA DEPT. OF COMMUNITY AFFAIRS
U.S. BUREAU OF RECLAMATION
U.S. CORPS OF ENGINEERS
U.S. BUREAU OF LAND MANAGEMENT
U.S. GEOLOGICAL SURVEY
NORTH DAKOTA STATE WATER COMMISSION
OLIVER COUNTY, NORTH DAKOTA
U.S. BUREAU OF SPORT FISHERIES AND WILDLIFE
U.S. DEPT. OF INTERIOR
U.S. DEPT OF STATE
NORTH DAKOTA STATE HIGHWAY DEPT.
STATE INTERNATIONAL COMMISSION - NORTH DAKOTA

TIME FRAME:
CONTINUING

LOCATION:
WY MT ND

ABSTRACT:

PROBLEM: DATA ARE ESSENTIAL TO THE LONG-RANGE ASSESSMENT OF THE WATER RESOURCES OF THE STATES AND TO ALL WATER PROJECT PLANNING AND MANAGEMENT. THIS PROJECT INCLUDES THE CONTINUING COLLECTION, INTERPRETATION, AND PUBLICATION OF ALL BASIC STREAMFLOW. GROUND WATER LEVEL, CHEMICAL QUALITY, AND SEDIMENT DATA COLLECTED BY THE GEOLOGICAL SURVEY IN THIS REGION:

OBJECTIVES:

1) A. TO COLLECT SURFACE-WATER DATA SUFFICIENT TO SATISFY NEEDS FOR CURRENT PURPOSE USES, SUCH AS: 1. ASSESSMENT OF WATER RESOURCES; 2. OPERATION OF RESERVOIRS OR INDUSTRIES, 3. FORECASTING, 4. DISPOSAL OF WASTES AND POLLUTION CONTROLS, 5. DISCHARGE DATA TO ACCOMPANY WATER-QUALITY MEASUREMENTS, 6) COMPACT AND LEGAL REQUIREMENTS, AND 7) RESEARCH OR SPECIAL STUDIES.

B. TO COLLECT DATA NECESSARY FOR ANALYTICAL STUDIES TO DEFINE FOR ANY LOCATION THE STATISTICAL PROPERTIES OF, AND TRENDS IN, THE OCCURRENCE OF WATER IN STREAMS, LAKES, ESTUARIES, ETC., FOR USE IN PLANNING AND DESIGN.

2. A. TO COLLECT WATER-LEVEL DATA SUFFICIENT TO PROVIDE A MINIMUM LONG-TERM DATA BASE SO THAT THE GENERAL RESPONSE OF THE HYDROLOGIC SYSTEM TO NATURAL CLIMATIC VARIATIONS AND INDUCED STRESSES IS KNOWN, AND POTENTIAL PROBLEMS CAN BE DEFINED EARLY ENOUGH TO ALLOW PROPER PLANNING AND MANAGEMENT.

B. TO PROVIDE A DATA BASE AGAINST WHICH THE SHORT-TERM RECORDS ACQUIRED IN AREAL STUDIES CAN BE ANALYZED. THIS ANALYSIS MUST:
1) PROVIDE AN ASSESSMENT OF THE GROUND WATER RESOURCE
2) ALLOW PREDICTION OF FUTURE CONDITIONS,
3) DETECT AND DEFINE POLLUTION AND SUPPLY PROBLEMS, AND
4) PROVIDE THE DATA BASE NECESSARY FOR MANAGEMENT OF THE RESOURCE.

3. TO PROVIDE A NATIONAL BANK OF WATER-QUALITY DATA FOR BROAD FEDERAL AND STATE PLANNING AND ACTION PROGRAMS AND TO PROVIDE DATA FOR FEDERAL MANAGEMENT OF INTERSTATE AND INTERNATIONAL WATERS.

4. TO PROVIDE A NATIONAL BANK OF SEDIMENT DATA FOR USE IN BROAD FEDERAL AND STATE PLANNING AND ACTION PROGRAMS AND TO PROVIDE DATA FOR FEDERAL MANAGEMENT OF INTERSTATE AND INTERNATIONAL WATERS.

1.3 WATER RESOURCES

APPROACH:

BASIC DATA ARE COLLECTED AND PROCESSED BY LONG-ESTABLISHED PROCEDURES OF THE GEOLOGICAL SURVEY. THE PROJECT RESULTS ARE PUBLISHED IN SEVERAL REPORTS THAT ARE PRODUCED ON AN ANNUAL BASIS AND IN OTHER REPORTS OF A SPECIALIZED NATURE.

REPORTS AND PUBLICATIONS:

FOR SPECIFIC REPORTS, CONTACT THE ABOVE MENTIONED STATE AND FEDERAL AGENCIES.

00000111
PROJECT TITLE:
WATER QUALITY AND BIOLOGICAL MONITORING PROGRAM FOR ENERGY RESOURCE AREAS - NORTH DAKOTA
PROJECT NUMBER:
CEA-75-3A
PROJECT SUPERVISOR:
U. S. GEOLOGICAL SURVEY
BISMARCK, ND
PRIMARY SPONSOR:
U.S. ENVIRONMENTAL PROTECTION AGENCY
LES SPRENGER
1860 LINCOLN ST.
DENVER, COLORADO 80203
303-837-4261
PRIMARY FUNDING AMOUNT:
24,390
TIME FRAME:
04 01 75 TO 04 01 76
ABSTRACT:
COLLECTION OF BASELINE WATER QUALITY AND BIOLOGICAL MONITORING DATA FOR ENERGY RESOURCE AREAS IN MISSOURI RIVER BASIN AND TRIBUTARIES. SIX STATIONS. SECOND YEAR OF DATA COLLECTION.
REPORTS AND PUBLICATIONS:
DATA WILL BE AVAILABLE FROM THE ENVIRONMENTAL PROTECTION AGENCY STORET DATA STORAGE AND RETRIEVAL SYSTEM.

00000112
PROJECT TITLE:
WATER QUALITY AND BIOLOGICAL MONITORING PROGRAM FOR ENERGY RESOURCE AREAS - WYOMING
PROJECT NUMBER:
CEA-75-5A, 5B(1), 5B(2)
PROJECT SUPERVISOR:
U. S. GEOLOGICAL SURVEY
CHEYENNE, WYOMING
PRIMARY SPONSOR:
U.S. ENVIRONMENTAL PROTECTION AGENCY
LES SPRENGER
1860 LINCOLN ST.
DENVER, COLORADO 80203
303-837-3073
PRIMARY FUNDING AMOUNT:
87,030
TIME FRAME:
07 01 75 TO 06 30 76
LOCATION:
WY
ABSTRACT:
COLLECTION OF BASELINE WATER QUALITY AND BIOLOGICAL MONITORING DATA FOR ENERGY RESOURCE AREAS IN THE POWDER RIVER COAL BASIN AND GREEN RIVER BASIN.
21 STATION NETWORK. SEVEN OF THE 21 STATIONS WERE ESTABLISHED DURING THE '74 - '75 PERIOD.
REPORTS AND PUBLICATIONS:
DATA WILL BE AVAILABLE FROM THE ENVIRONMENTAL PROTECTION AGENCY STORET DATA STORAGE AND RETRIEVAL SYSTEM.

00000113
PROJECT TITLE:
WATER QUALITY EFFECTS OF COAL DEVELOPMENTS ON THE TONGUE RIVER RESERVOIRS
PROJECT NUMBER:
CEA-75-37A
INVESTIGATORS:
JERRY KEISER
MONTANA WATER QUALITY BUREAU

BILLINGS, MT
406-252-5697
PROJECT SUPERVISOR:
MAX BOTZ
MONTANA WATER QUALITY BUREAU
HELENA, MT
406-449-2406
PRIMARY SPONSOR:
U. S. ENVIRONMENTAL PROTECTION AGENCY
MARSHALL PAYNE
1860 LINCOLN
DENVER, COLORADO 80203
303-837-4261
PRIMARY FUNDING AMOUNT:
23,910
TIME FRAME:
07 01 75 TO 06 01 76
LOCATION:
MT
ABSTRACT:

COAL DEVELOPMENT IN MONTANA AND WYOMING WILL IMPACT THE TONGUE RIVER AS WELL AS THE TONGUE RIVER RESERVOIR. THE STUDY IS DESIGNED TO ANSWER THREE BASIC QUESTIONS: 1. IS THE TONGUE RIVER RESERVOIR ACCUMULATING METALS, SALTS AND/OR SEDIMENTS ORIGINATING FROM MINING ACTIVITIES? 2. WHAT EFFECT WILL INCREASED NUTRIENT LEVELS HAVE ON THE RIVER ECOSYSTEM? AND, 3. WHAT ARE THE PRESENT CONCENTRATIONS OF METALS IN AQUATIC ORGANISMS? AREAS OF STUDY INCLUDE THE RESERVIOR, TONGUE RIVER AND MINE EFFLUENTS.

00000114
PROJECT TITLE:
WATER QUALITY EFFECTS OF CANADIAN COAL DEVELOPMENT ON THE EAST POPLAR RIVER, MONTANA
PROJECT NUMBER:
OEA-75-7A
INVESTIGATORS:
JERRY KEISER
MONTANA WATER QUALITY BUREAU
BILLINGS, MONTANA
406-252-5697
PROJECT SUPERVISOR:
MAX BOTZ
MONTANA WATER QUALITY BUREAU
HELENA, MONTANA
406-449-2406
PRIMARY SPONSOR:
U. S. ENVIRONMENTAL PROTECTION AGENCY
MARSHALL PAYNE
1860 LINCOLN ST.
DENVER, COLORADO 80203
303-837-4261
PRIMARY FUNDING AMOUNT:
19,695
TIME FRAME:
07 01 75 TO 06 30 76
LOCATION:
MT
ABSTRACT:

COAL MINING ACTIVITIES, DEVELOPMENT OF FOSSIL FUEL GENERATING FACILITY, AND DAM CONSTRUCTION IN CANADA COULD IMPACT THE EAST POPLAR RIVER ECOSYSTEM IN NORTHEASTERN MONTANA. WATER QUALITY DETERIORATION AND REDUCED STREAM FLOWS ARE A MAJOR CONCERN. THE STUDY WILL CONSIST BASICALLY OF A REVIEW OF MINING AND POWER PRODUCTION PLANS FOR THE FACILITY AT CORNONACH, SASKATCHEWAN, WATER QUALITY SAMPLING, SEDIMENT STUDIES, COLLECTION OF MACROINVERTEBRATES, AND FISHERY INVESTIGATIONS. THE SURVEILLANCE AND ANALYSIS DIVISION, U.S. EPA WILL PROVIDE 12-MANWEEKS OF ASSISTANCE IN CONDUCTING INTENSIVE FISHERY STUDIES.

00000115
PROJECT TITLE:
FIELD TESTING AND ADAPTING OF A METHODOLOGY TO MEASURE "INSTREAM VALUES" IN THE NORTHERN GREAT PLAINS (NGP) REGION - TONGUE RIVER DEWATERING EXPERIMENTS AND METHODS VERIFICATION
PROJECT NUMBER:
OEA-75-22A
INVESTIGATORS:
A. SILVERMAN; KEN BOVEE; JAMES A. GORE
PROJECT SUPERVISOR:
A. SILVERMAN
UNIV. OF MONTANA
MISSOULA, MONTANA
406-243-0211
PRIMARY SPONSOR:
U. S. ENVIRONMENTAL PROTECTION AGENCY
LOYD PARRISH; DENIS NELSON
1860 LINCOLN ST.
DENVER, COLORADO 80203
303-837-2226
PRIMARY FUNDING AMOUNT:
25,418
TIME FRAME:
07 01 75 TO 06 30 76
LOCATION:
MT
ABSTRACT:

THE SURFACE MINING OF COAL RESOURCES IN THE NORTHERN GREAT PLAINS REGION, COUPLED WITH THE DEVELOPMENT OF COAL-TO-ENERGY CONVERSION FACILITIES COULD HAVE A

SIGNIFICANT EFFECT ON WATER QUALITY AND THE FLOW REGIMEN OF STREAMS. THE SUBJECT STUDY REPRESENTS THE SECOND PHASE OF FIELD TESTING AND VERIFICATION OF A METHODOLOGY THAT CAN BE USED TO ASSESS AND PREDICT CHANGES IN AQUATIC ECOSYSTEMS AS A RESULT OF VARIATIONS IN STREAM FLOWS.

FLOW CRITERIA BASED ON FISHERY REQUIREMENTS HAVE BEEN TENTATIVELY ESTABLISHED BY USING THE STONECAT (NOTURUS FLAVUS) AS AN INDICATOR SPECIES. THROUGH ELECTROFISHING TECHNIQUES STONECAT DISTRIBUTIONS ARE TO BE IDENTIFIED ACCORDING TO WATER DEPTH, VELOCITY AND BOTTOM TYPE. EFFECTS OF FLOW CHANGES ON ICE FORMATION AND SEDIMENT TRANSPORT ARE BEING ASSESSED, ALONG WITH A STUDY OF SHALLOW GROUND WATER VARIATION ADJACENT TO TONGUE RIVER AND ITS EFFECT ON RIPARIAN VEGETATION AND AN ASSESSMENT OF BENTHIC MACROINVERTEBRATE FAUNA OF THE TONGUE RIVER.

00000116

PROJECT TITLE:

PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE SHALLOW GROUND WATER SYSTEM NORTH OF GILLETTE, WYOMING.

PROJECT NUMBER:

OEA-75-30A

PROJECT SUPERVISOR:

U.S. GEOLOGICAL SURVEY
WYOMING DISTRICT OFFICE
WATER RESOURCES DIVISION
P. O. BOX 2087
CHEYENNE, WY 82001

PRIMARY SPONSOR:

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VIII
TERRY THOEM
OFFICE OF ENERGY ACTIVITIES
1860 LINCOLN
DENVER, COLORADO 80203
303-837-3073

PRIMARY FUNDING AMOUNT:

21,000

TIME FRAME:

06 30 75 TO 12 31 75

LOCATION:

WY

ABSTRACT:

PURPOSE: TO PERMIT DESCRIPTION OF THE WATER RESOURCE CONTAINED IN THE SHALLOW AQUIFERS OF THE GILLETTE AREA. TO PERMIT PREDICTION OF THE EFFECTS OF SURFACE MINING OF COAL, AND OF LARGE WATER IMPOUNDMENTS ON THESE WATER RESOURCES. TO DO SO BY ADDING ON TO AN EXISTING GEOLOGIC DRILLING PROGRAM THE COLLECTION OF PHYSICAL AND CHEMICAL HYDROLOGIC DATA. THE PREDICTIVE CAPABILITY IS TO BE USED BY FEDERAL, INDIAN, AND STATE PLANNING AND REGULATORY AUTHORITIES TO MINIMIZE DAMAGE TO THE AQUATIC SYSTEM.

REPORTS AND PUBLICATIONS:

REPORTS: MAPS SHOWING STATION LOCATIONS WILL BE PROVIDED TO THE PROJECT SPONSOR AND TO THE STATE OF WYOMING AS DESCRIBED IN THE SCOPE OF WORK. CHEMICAL DATA WILL BE SUPPLIED TO THE SAME INDIVIDUALS OR AGENCIES AS SOON AS IT BECOMES AVAILABLE FROM THE LABORATORY.

00000117

PROJECT TITLE:

WATER QUALITY IMPACTS OF SURFACE COAL MINING IN SOUTHWESTERN NORTH DAKOTA

PROJECT NUMBER:

OEA-75-28A

PROJECT SUPERVISOR:

W. R. SCOTT - DISTRICT CHIEF
U.S. GEOLOGICAL SURVEY
NORTH DAKOTA DISTRICT OFFICE
WATER RESOURCES DIVISION
BISMARCK, ND

PRIMARY SPONSOR:

U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VIII
TERRY THOEM
OFFICE OF ENERGY ACTIVITIES
1860 LINCOLN
DENVER, COLORADO 80203
303-837-3073

PRIMARY FUNDING AMOUNT:

11,000

TIME FRAME:

06 30 75 TO 04 30 76

LOCATION:

ND

ABSTRACT:

ABSTRACT: THE EFFORT COVERS THE CONTINUATION OF WATER QUALITY MONITORING IN THE VICINITY OF GASCOYNE, NORTH DAKOTA. SURFACE MINING OF COAL HAS BEGUN TO IMPACT WATER QUALITY AND MAINTENANCE OF THE SHALLOW GROUND WATER SYSTEM APPEARS CRITICAL TO OBTAINING AN UNDERSTANDING OF THE MECHANISMS CAUSING DEGRADATION OF WATER QUALITY. THUS, IT IS HOPED TO REFINE OUR ABILITY TO PREDICT IMPACTS ON THE GROUND AND SURFACE WATER SYSTEM AS PART OF THE PLANNING PROCESS.

PURPOSE: TO MAINTAIN IN THE CHEMICAL MONITORING PROGRAM INSTITUTED IN 1974 AT A SURFACE COAL MINE NEAR GASCOYNE, NORTH DAKOTA. CHEMICAL DATA WILL BE USED TO DESCRIBE THE PRESENT AND POTENTIAL IMPACTS OF SURFACE MINING IN THE AREA. THE ULTIMATE PURPOSE OF THE MONITORING IS TO CALIBRATE PREDICTIVE METHODS TO BE UTILIZED FOR PLANNING AND REGULATORY PURPOSES.

REPORTS AND PUBLICATIONS:

REPORTS: THE GEOLOGICAL SURVEY WILL PROVIDE THE

PROJECT SPONSOR AND THE STATE OF NORTH DAKOTA SEMIANNUAL REPORTS SHOWING FIELD DATA AND RESULTS OF WATER QUALITY MEASUREMENTS. THE REPORTS WILL CONTAIN STATION DESCRIPTIONS AND WATER QUALITY DATA ALONG WITH PERTINENT INFORMATION DESCRIBING THE HYDROLOGIC SYSTEM AS PHYSICAL MEASUREMENTS DESCRIBE IT. AT THE END OF THE TERM OF THIS AGREEMENT, THE SURVEY WILL PROVIDE EPA WITH A DRAFT REPORT WHICH INCORPORATES ALL PERTINENT DATA AVAILABLE FROM THE GASCOYNE SITE TO DISCUSS THE IMPACTS OF MINING ON THE HYDROLOGIC SYSTEM AND THE USEFULNESS OF THE KNOWLEDGE GAINED FOR ESTIMATING IMPACTS IN OTHER AREAS.

00000118

PROJECT TITLE:

GEOLOGY AND HYDROLOGY OF THE MADISON LIMESTONE IN SOUTH DAKOTA

INVESTIGATORS:

ROBERT A. SCHOON

PROJECT SUPERVISOR:

D. J. MCGREGOR
SOUTH DAKOTA GEOLOGICAL SURVEY
UNIV. OF SOUTH DAKOTA, SCIENCE CENTER
VERMILLION, SD 57069
605-624-4471

PRIMARY SPONSOR:

SOUTH DAKOTA GEOLOGICAL SURVEY

TIME FRAME:

08 15 74 TO INDEFINITE

LOCATION:

SD

ABSTRACT:

THE PURPOSE OF THIS REPORT IS TO PROVIDE INTERESTED CITIZENRY OF THE STATE WITH A LOW BUDGET STUDY THAT IS INDEPENDENT OF THE MASSIVE FEDERAL STUDY THAT DEALS WITH THE EFFECTS OF MASSIVE WITHDRAWALS OF WATER FROM THE MADISON FOR USE IN MOVING COAL IN A COAL SLURRY PIPELINE FROM WYOMING TO ARKANSAS. POSSIBLE RAMIFICATIONS CONCERNING EFFECTS ON TROUT POPULATIONS IN THE BLACK HILLS AREA, ACCUMULATIONS OF OIL AND GAS THAT MAY BE PRESENT, AND THE DAKOTA ARTESIAN SYSTEM WHICH IS A MAJOR AQUIFER IN THE STATE.

00000119

PROJECT TITLE:

COAL DEVELOPMENT ALTERNATIVES AN ASSESSMENT OF WATER USE AND ECONOMIC IMPLICATIONS

INVESTIGATORS:

DAVID D. FREUDENTHAL; PETER RICCIARDELLI; MICHAEL N. YORK

PROJECT SUPERVISOR:

DON BRUNK
WYOMING DEPT. OF ECONOMIC PLANNING & DEVELOPMENT
720 WEST 19 ST.
CHEYENNE, WY 82002
307-777-7284

ABSTRACT:

THE REPORT CONCENTRATES ON COAL DEVELOPMENT RELATED DEMANDS FOR WATER AND THE IMPLICATION OF THOSE DEMANDS. THE STUDY IDENTIFIES COAL UTILIZATION ALTERNATIVES, ANALYSIS OF THESE ALTERNATIVES WITH RESPECT TO THE WYOMING SITUATION, WATER DEMANDS FOR EACH ALTERNATIVE, IDENTIFICATION OF FISCAL AND ENVIRONMENTAL IMPACTS ASSOCIATED WITH EACH PROCESS. IN-STATE AND OUT-OF-STATE COAL UTILIZATION PROCESSES ARE COMPARED.

REPORTS AND PUBLICATIONS:

D. D. FREUDENTHAL, P. RICCIARDELLI AND M. N. YORK. 'COAL DEVELOPMENT ALTERNATIVES. AN ASSESSMENT OF WATER USE AND ECONOMIC IMPLICATIONS.' DECEMBER, 1974. DEPARTMENT OF ECONOMIC PLANNING AND DEVELOPMENT (OUT OF PRINT, REPRINTING IS CONTEMPLATED)

00000120

PROJECT TITLE:

STUDY AND MONITORING OF FORT UNION BASIN - WATER QUALITY

PROJECT SUPERVISOR:

DON WILLEMS
MONTANA DEPT. OF HEALTH & ENVIRONMENTAL SCI.
COGSWELL BUILDING
HELENA, MT 59601

PRIMARY SPONSOR:

U.S. EPA, REGION VIII
TERRY THOEM
1860 LINCOLN
DENVER, CO 80203
303-837-3073

PRIMARY FUNDING AMOUNT:

58,045

TIME FRAME:

06 01 75 TO 07 01 76

LOCATION:

MT

ABSTRACT:

FOUR PROJECTS WILL BE UNDERTAKEN BY THE MONTANA DEPARTMENT OF ENVIRONMENTAL SCIENCES VIA FUNDING OF THIS PROJECT. WATER QUALITY ANALYSES WILL BE PERFORMED ON THE POPLAR RIVER FOR CHEMICAL, BIOLOGICAL AND METALS ANALYSES. SECONDLY, A FISH TAGGING STUDY WILL BE PERFORMED BY EPA IN CONJUNCTION WITH THE STATE ON THE POPLAR. THIRD, THE WATER QUALITY BUREAU WILL PROVIDE ONSITE ASSISTANCE TO AN EPA CONTRACTOR REGARDING WATER QUALITY MODELING. FINALLY, WATER QUALITY ANALYSES WILL BE PERFORMED ON THE TONGUE RIVER AND THE TONGUE RIVER RESERVOIR.

00000121
PROJECT TITLE:
TOXIC EFFECTS ON THE AQUATIC BIOTA FROM COAL AND OIL SHALE DEVELOPMENT
INVESTIGATORS:
R. K. SKOGERBOE; R. C. RUSSO
PROJECT SUPERVISOR:
ROBERT V. THURSTON
MONTANA STATE UNIV., FISHERIES BIOASSAY LAB.
BOZEMAN, MT 59715
406-994-3371
PRIMARY SPONSOR:
U.S. EPA
DULUTH, MN 55801
SECONDARY SPONSORS:
MONTANA DEPT. OF FISH AND GAME
COLORADO STATE UNIV., NATURAL RESOURCE ECOL. LAB.
PRIMARY FUNDING AMOUNT:
600,000
TIME FRAME:
07 01 75 TO 06 30 76
LOCATION:
MT
ABSTRACT:

THE OVERALL OBJECTIVE OF THIS INVESTIGATION IS TO PROVIDE PREDICTIVE INFORMATION WITH REGARD TO POTENTIAL TOXICANTS TO THE AQUATIC ENVIRONMENT RESULTING FROM COAL AND OIL SHALE EXTRACTION AND CONVERSION. THE SPECIFIC OBJECTIVES ARE TO IDENTIFY AND QUANTIFY THOSE CHEMICAL PRODUCTS OF COAL AND OIL SHALE EXTRACTION AND CONVERSION WHICH MAY REACH SURFACE WATERS, AND TO DETERMINE BY BOTH FIELD STUDIES AND LABORATORY BIOASSAYS THE DEGREE TO WHICH THOSE CHEMICALS MAY BE ACUTELY OR CHRONICALLY TOXIC TO FISH AND AQUATIC INVERTEBRATES, OR MAY BECOME INVOLVED AS PART OF THE FOOD CHAIN. FOUR CATEGORIES OF ENERGY DEVELOPMENT WILL BE CONSIDERED: COAL EXTRACTION, OIL SHALE EXTRACTION AND PROCESSING, COAL GASIFICATION, AND COAL-TO-ENERGY CONVERSION. POTENTIAL TOXICANTS TO THE AQUATIC ENVIRONMENT WILL BE IDENTIFIED BY A COMBINATION OF FIELD, LABORATORY, AND LITERATURE STUDIES, AS WELL AS BY INFORMATION GAINED FROM COOPERATIVE INPUT FROM OTHER ENERGY-RELATED RESEARCH PROGRAMS. CONCURRENT CHEMICAL AND BIOLOGICAL LABORATORY AND FIELD BIOASSAYS AS WELL AS AQUATIC DISTRIBUTION STUDIES WILL DICTATE WHAT ADDITIONAL OR ALTERNATE EMPHASIS IS REQUIRED IN THE LABORATORY AND FIELD CHEMICAL STUDIES.

00000122
PROJECT TITLE:
'A COOPERATIVE PROGRAM TO EVALUATE SURFACE AND GROUND WATER PROBLEMS ASSOCIATED WITH POTENTIAL STRIP MINE SITES.' A JOINT EFFORT OF MONTANA STATE UNIVERSITY, MONTANA COLLEGE OF MINERAL SCIENCE & TECHNOLOGY, UNIVERSITY OF WYOMING, NORTH DAKOTA STATE UNIVERSITY AND UNIVERSITY OF NORTH DAKOTA.
INVESTIGATORS:
R. KOOB; P. RECHARD
PROJECT SUPERVISOR:
THEODORE T. WILLIAMS
MONTANA STATE UNIV., DEPT. OF CIVIL ENG. & MECHANICS
BOZEMAN, MONTANA 59715
PRIMARY SPONSOR:
U.S. EPA, CINCINNATI NAT. ENV. RESEARCH CENTER
CINCINNATI, OH 45268
PRIMARY FUNDING AMOUNT:
629,541
TIME FRAME:
07 01 75 TO 07 01 78
LOCATION:
MT
ABSTRACT:

OBJECTIVES: TO IDENTIFY POSSIBLE IMPACTS OF COAL MINING AND DEVELOPMENT IN THE GREAT PLAINS ON THE SURFACE AND GROUNDWATER SYSTEMS OF THE SURROUNDING AREA. MEETING THIS OBJECTIVE REQUIRES THE COLLECTION OF SUFFICIENT DATA TO TEST OR DEVELOP WATERSHED OR MANAGEMENT MODELS WHICH WILL BE USED TO MEASURE OR PREDICT IMPACTS OF DEVELOPMENT.

SUB-OBJECTIVES: 1. OBTAIN AN EQUATION OF BALANCE FOR ALL WATER INFLOW AND OUTFLOW IN EACH OF THREE STUDY SITES (ONE EACH IN MONTANA, NORTH DAKOTA AND WYOMING). 2. CHARACTERIZE THE OVERBURDEN FROM A PHYSICAL AND CHEMICAL POINT OF VIEW AS WELL AS DETERMINE ITS RELATIONSHIP TO THE WATER COMING TO THE SURFACE. 3. CHARACTERIZE THE CHEMICAL FEATURES OF THE MINED SITES IN EACH OF THE THREE STATES.

FINAL SPECIFICATION OF THE SPECIFIC STUDY SITES HAS NOT BEEN COMPLETED. NORTH DAKOTA WILL PROBABLY USE THE NORTH AMERICAN MINING SITE NEAR UNDERWOOD. WYOMING WILL PROBABLY USE THE ARCO BLACK THUNDER MINING SITE NEAR GILLETTE. THE MONTANA INVESTIGATORS HAVE HAD CONSIDERABLE DIFFICULTY SELECTING A SUITABLE SITE. THE ORIGINAL SITE PROPOSED WAS THE WESTMORELAND SITE ON SARPY CREEK. BECAUSE OF LARGE AMOUNTS OF PRIOR WORK WHICH HAS BEEN DONE THERE, THIS SITE HAS BEEN ALL BUT REJECTED. CURRENT THINKING (AS OF JULY 7, 1975) IS TO CONSIDER THE SHELL OIL COMPANY SITE ON YOUNGS CREEK (OR ONE OF THEIR SITES ON NEARBY WATERSHEDS)

ON THE CROW RESERVATION. IT SHOULD BE NOTED THAT EPA RESERVES THE RIGHT TO PASS FINAL JUDGMENT ON SELECTION OF SITES; ALSO THAT A PRIMARY GOAL OF EPA IN FUNDING THE STUDY IS TO OBTAIN BOTH 'BEFORE' AND 'AFTER' DATA FOR THE SITES. THIS LATTER GOAL IS OBVIOUSLY NOT TOO LIKELY TO BE MET IN THE CASE OF THE MONTANA SITES PROPOSED, UNLESS THE STUDY CAN BE EXTENDED BEYOND THE 3-YEAR LIMIT PRESENTLY SET.

00000123

PROJECT TITLE:
GROUND WATER ANALYSES

PROJECT SUPERVISOR:
GEORGE PIKE
U.S. GEOLOGICAL SURVEY - WATER RESOURCES DIV.
HELENA, MT 59601

PRIMARY SPONSOR:
U.S. EPA, REGION VIII
TERRY THOEM
1860 LINCOLN
DENVER, CO 80203
303-837-3073

PRIMARY FUNDING AMOUNT:
36,000

TIME FRAME:
06 30 75 TO 06 30 76

LOCATION:
MT

ABSTRACT:
GROUNDWATER ANALYSES OF SHALLOW AQUIFERS IN THE TONGUE, YELLOWSTONE AND MISSOURI DRAINAGES WILL BE PERFORMED. FIELD SAMPLING, CHEMICAL ANALYSES AND THERMAL IMAGERY IS INVOLVED.

00000124

PROJECT TITLE:
LEVEL B WATER AND RELATED LAND RESOURCES STUDY OF THE YELLOWSTONE RIVER BASIN AND ADJACENT COAL AREAS IN THE STATES OF MONTANA, WYOMING, NORTH DAKOTA AND SOUTH DAKOTA.

INVESTIGATORS:
ROBERT MADSEN
TRANSWESTERN LIFE BLDG.
BILLINGS, MONTANA 59101

PROJECT SUPERVISOR:
KEITH H. CORRIGALL
MONTANA DEPT. OF NATURAL RESOURCES
32 S. EWING
HELENA, MT 59601

PRIMARY FUNDING AMOUNT:
2,000,000

TIME FRAME:
06 16 75 TO 11 30 76

LOCATION:
MT

ABSTRACT:
DEVELOPMENT OF A LEVEL B PLAN FOR THE REGIONAL AREA ON A MULTIPLE OBJECTIVE BASIS OF NATIONAL ECONOMIC DEVELOPMENT TO INCREASE TO THE OUTPUT OF THE NATIONS GOODS AND SERVICES PLUS IMPROVEMENT OF ECONOMIC EFFICIENCY AND ENVIRONMENTAL QUALITY TO PROTECT, MAINTAIN AND CONSERVE KEY NATURAL AND CULTURAL RESOURCES. PLAN WILL BE BASED ON FOUR ACCOUNT SYSTEM (MONETARY AND NONMONETARY TERMS) OF NED, EQ, RED, AND SOCIAL FACTORS. PLAN WILL BE BASED ON GENERATION OF ALTERNATIVE PLANS AND SELECTION/IMPLEMENTATION OF AN OPTIMUM PLAN FOR THE AREA.

00000125

PROJECT TITLE:
COLLECTION OF SURFACE-WATER, GROUND-WATER, AND QUALITY OF WATER DATA IN SOUTHEASTERN MONTANA. EVALUATION OF AQUIFERS TO DETERMINE WATER AVAILABILITY AND POSSIBLE IMPACTS FROM ENERGY PRODUCTION.

PROJECT SUPERVISOR:
GEORGE M. PIKE
U.S. GEOLOGICAL SURVEY, WATER RESOURCES DIV.
P. O. BOX 1696
HELENA, MT 59601
406-442-9040 X3263

PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY, WATER RESOURCES DIV.

PRIMARY FUNDING AMOUNT:
750,000

TIME FRAME:
07 01 73 TO CONTINUING

LOCATION:
MT

ABSTRACT:
TO PROVIDE BASIC-DATA DESCRIBING STREAMFLOW, QUALITY OF WATER, SEDIMENT LOADS, AND GROUND WATER IN THE NORTHERN GREAT PLAINS COAL REGION OF MONTANA. INTERPRETATIVE STUDIES ARE DESIGNED TO COLLECT AND USE BASELINE DATA TO HELP PREDICT THE EFFECTS OF MINING OR RELATED ACTIVITIES ON THE SHALLOW AQUIFERS. A STUDY OF THE MADISON LIMESTONE IS DESIGNED TO HELP DETERMINE THE AVAILABILITY OF WATER AND TO EVENTUALLY PREDICT THE EFFECTS OF DEVELOPING LARGE WATER SUPPLIES FOR INDUSTRY.

REPORTS AND PUBLICATIONS:
WATER-RESOURCES INVESTIGATIONS OF THE U.S. GEOLOGICAL SURVEY IN THE NORTHERN GREAT PLAINS COAL REGION OF EASTERN MONTANA, 1974-75. U.S. GEOLOGICAL SURVEY OPEN-FILE REPORT, 22 P.

00000126
PROJECT TITLE:
SURFACE WATER QUALITY MONITORING
PROJECT SUPERVISOR:
GEORGE PIKE
U.S. GEOLOGICAL SURVEY, WATER RESOURCES DIV.
HELENA, MT 59601
PRIMARY SPONSOR:
U.S. EPA, REGION VIII
LES SPRENGER
1860 LINCOLN
DENVER, CO 80203
303-837-3073
PRIMARY FUNDING AMOUNT:
27,990
TIME FRAME:
06 30 75 TO 06 30 76
LOCATION:
MT
ABSTRACT:
WATER QUALITY ANALYSES INCLUDING FIELD MEASUREMENTS, METALS, CHEMICAL, AND BIOLOGICAL ANALYSES AT 10 LOCATIONS ON THE YELLOWSTONE AND 2 LOCATIONS ON THE TONGUE ARE BEING PERFORMED FOR A YEARS TIME PERIOD.

00000127
PROJECT TITLE:
HYDROLOGY INVESTIGATIONS AT COLSTRIP, MONTANA
PROJECT SUPERVISOR:
WAYNE VAN VOAST
MONTANA COLLEGE OF MINERAL SCIENCE AND TECHNOLOGY
BUTTE, MONTANA 59701
PRIMARY SPONSOR:
WESTERN ENERGY COMPANY
CARL R. ANDERSON
40 E. BROADWAY
BUTTE, MT
406-723-5421
PRIMARY FUNDING AMOUNT:
PROPRIETARY
TIME FRAME:
01 01 73 TO 01 01 75
LOCATION:
MT
ABSTRACT:
THIS THREE YEAR PROJECT WILL EVALUATE GROUND WATER QUALITY, FLOW AND POSSIBLE CHANGES RESULTING FROM MINING OPERATIONS.
REPORTS AND PUBLICATIONS:
INTERIM REPORT FILED WITH THE DEPARTMENT OF STATE LANDS AND THE DEPARTMENT OF NATURAL RESOURCES.

00000128
PROJECT TITLE:
GROUND-LEVEL MEASUREMENTS OF NUCLEI FROM COAL DEVELOPMENT IN NORTHERN GREAT PLAINS: WORK PLANS FOR DESIGN OF A MONITORING PROGRAM
PROJECT NUMBER:
1057C066
PROJECT SUPERVISOR:
BRIANT L. DAVIS
SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY
RAPID CITY, SD 57701
605-394-2291
PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
KENNETH BLACKBURN
FRATT BLDG. 306A
BILLINGS, MT 59101
245-6711 X6665
PRIMARY FUNDING AMOUNT:
49,500
TIME FRAME:
02 15 75 TO 06 30 76
LOCATION:
MT ND WY
ABSTRACT:

THE GOAL OF THIS STUDY IS TO PREPARE A TECHNICAL AND SCIENTIFIC FOUNDATION FOR OBTAINING PARTICULATE AND GASEOUS EMISSION INFORMATION & ITS USE IN PREDICTING OR EVALUATING EFFEC OF SUCH MATERIALS ON THE WEATHER PROCESSES IN THE NORTHERN GREAT PLAINS. THE PROGRAM GOAL LEADS TOWARD AN ELIMINATION OF THE UNCERTAINTY WHICH NOW EXISTS CONCERNING THE EFFECT OF NUMEROUS SMALL PARTICULATES ON RAINFALL OR SNOWFALL FROM CUMULUS OR STRATIFORM CLOUDS. THE ULTIMATE RESULTS WILL BE OF VALUE TO THE AGRICULTURAL INDUSTRY IN STATES DOWNWIND FROM THE COAL DEVELOPMENT AREAS.

00000129
PROJECT TITLE:
COAL POWER PLANT STACKS EFFLUENT EFFECTS ON VIGOR AND TRACE ELEMENT CONCENTRATIONS OF RANGE PLANTS AND ANIMALS
INVESTIGATORS:
F. F. MUNSHOWER; E. J. DEPUIT; R. L. HODDER
RESEARCH FACILITY:
MONTANA STATE UNIV., AG. EXP. STATION
BOZEMAN, MT 59715
PRIMARY SPONSOR:
MONTANA POWER CO.
PRIMARY FUNDING AMOUNT:
PROPRIETARY
TIME FRAME:
07 01 72 - CONTINUING
LOCATION:
MT
ABSTRACT:

THE GENERAL GOAL OF THIS STUDY INVOLVES EVALUATION OF EFFECTS OF STACKS EMISSIONS FROM A COAL-FIRED STEAM ELECTRIC GENERATING COMPLEX NEAR COLSTRIP IN SOUTHEASTERN MONTANA ON ADJACENT RANGE VEGETATION AND ANIMALS, WITH PARTICULAR EMPHASIS ON PRODUCTIVITY, VIGOR AND TRACE ELEMENT CONCENTRATION OF THE BIOTA. EXTENSIVE BASELINE DATA ON PLANT AND ANIMAL TRACE ELEMENT CONCENTRATIONS AND PRODUCTION HAVE BEEN COLLECTED PRIOR TO POWER PLANT OPERATION. SIMILAR DATA WILL BE COLLECTED FOLLOWING INITIAL POWER PLANT OPERATION DURING 1975 AND THEREAFTER, AND ATTENTION WILL BE FOCUSED ON CHANGES IN VEGETATIVE VIGOR, PRODUCTION AND COMMUNITY COMPOSITION, AS WELL AS CHANGES IN PLANT AND ANIMAL TRACE ELEMENT CONCENTRATION, ASSOCIATED WITH INCREASED ATMOSPHERIC POLLUTANT LEVELS. AN INTEGRATED PICTURE OF STACKS EMISSIONS EFFECTS ON THE FLORA AND FAUNA OF THE AREA SHOULD THUS EMERGE AFTER A REASONABLE INTERIM.

REPORTS AND PUBLICATIONS:
F. F. MUNSHOWER, B. W. SINDELAR AND D. R. NEUMAN, 1974. 'ELEMENTAL CONCENTRATIONS IN RANGE VEGETATION AND ANIMALS' 1972-1974, M.A.E.S., MONTANA STATE UNIVERSITY, BOZEMAN, MONTANA. 73P.

00000130
PROJECT TITLE:
IMPACT OF COAL DEVELOPMENT ON PLANT ECOSYSTEMS IN WESTERN NORTH DAKOTA.
INVESTIGATORS:
D. S. GALITZ; W. T. BARKER; W. C. WHITMAN
RESEARCH FACILITY:
NORTH DAKOTA STATE UNIV., DEPT. OF BOTANY
FARGO, ND 58103
PRIMARY SPONSOR:
U.S. DEPT. OF AGRICULTURE, COOPERATIVE RESEARCH SERVICE
PRIMARY FUNDING AMOUNT:
1974 - 10,000
1975 - 11,000
TIME FRAME:
06 05 74 TO 12 31 77
LOCATION:
ND
ABSTRACT:

THE OBJECTIVE IS TO DETERMINE THE EFFECTS OF THE PROBABLE CHANGES IN AIR QUALITY INDUCED BY COAL DEVELOPMENT ON PLANT ECOSYSTEMS IN WESTERN NORTH DAKOTA. THE NATIVE GRASSLAND, WOODLAND AND AQUATIC ECOSYSTEMS IN AND AROUND STANTON WILL BE IDENTIFIED AND FLORISTIC COMPOSITIONS, SPECIES FREQUENCE AND BASAL COVERAGE DETERMINED FOR REPRESENTATIVE ECOSYSTEMS. PERMANENT PLOTS WILL BE ESTABLISHED AND USED FOR GATHERING BASELINE

DATA ON NATIVE PLANT COMMUNITIES. SEVERAL NATIVE AND CROP SPECIES WILL BE STUDIED IN GROWTH CHAMBERS AND GREENHOUSES TO DETERMINE EFFECTS OF SPECIFIC AIR POLLUTANTS ON SELECTED PHYSIOLOGIC PROCESSES OF PLANTS.

00000131
PROJECT TITLE:
METEREOLOGY AND AIR QUALITY PROGRAM, JIM BRIDGER PROJECT
INVESTIGATORS:
G. W. JONES
RESEARCH FACILITY:
WESTERN SCIENTIFIC SERVICES, INC.
P. O. BOX 1965
FORT COLLINS, CO 80521
PRIMARY SPONSOR:
PACIFIC POWER & LIGHT CO.
IDAHO POWER CO.
PRIMARY FUNDING AMOUNT:
PROPRIETARY
TIME FRAME:
01 01 70 TO 01 01 80
LOCATION:
WY
ABSTRACT:
THE INTENT OF THIS WORK IS TO PROVIDE A CONTINUATION OF THE METEREOLOGY AND AIR QUALITY PROGRAM COMMENCED AT THE JIM BRIDGER PROJECT SITE IN SEPTEMBER, 1970, INCLUDING (A) OPERATION, MAINTENANCE, AND REPAIR OF THE METEREOLOGY TOWER SYSTEM FOR THE PERIOD SEPTEMBER 1, 1972, THROUGH MAY 31, 1974, WHEN THE FIRST POWER GENERATING UNIT IS EXPECTED TO BEGIN PRODUCTION; (B) CONTINUE THE AIR QUALITY NETWORK OBSERVATION AND PRIMARY STATION AIR QUALITY SAMPLING PROGRAM ON A REDUCED LEVEL OF EFFORT; (C) PROVIDE PROFESSIONAL AND CONSULTING SERVICES FOR ANALYSIS AND REPORTING OF THE DATA COLLECTED.

00000132
PROJECT TITLE:
ENVIRONMENTAL ASPECTS OF SLAGGING FIXED-BED COAL HIGH-BTU GASIFICATION PROCESS
INVESTIGATORS:
R. C. ELLMAN; M. M. FEGLEY; S. A. CODEY
RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
GRAND FORKS ENERGY RESEARCH CENTER
GRAND FORKS, ND 58201
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
1975 - 230,000
TIME FRAME:
01 01 74 - CONTINUING
LOCATION:
ND
ABSTRACT:
DETERMINATION OF THE TYPE, AMOUNT, AND POLLUTION ASPECTS OF LIQUID, GASEOUS AND PARTICULATE EFFLUENTS PRODUCED IN THE HIGH-BTU GASIFICATION OF WESTERN COALS IN A SLAGGING, FIXED-BED GASIFIER.

00000133
PROJECT TITLE:
ASH FOULING ENCOUNTERED IN COMBUSTION OF WESTERN COALS
INVESTIGATORS:
E. A. SONDREAL; P. H. TUFTE
RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
GRAND FORKS ENERGY RESEARCH CENTER
GRAND FORKS, ND 58201
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
1973 - 148,000
1974 - 110,000
1975 - 250,000
TIME FRAME:
01 01 65 - CONTINUING
LOCATION:
ND
ABSTRACT:
DEVELOPMENT OF INFORMATION ON FIRESIDE ASH FOULING TO IMPROVE THE THERMAL EFFICIENCY AND AVAILABILITY OF STEAM GENERATORS BURNING WESTERN U.S. COALS. DEVELOPMENT OF DETAILED INFORMATION ON THE ASH CHARACTERISITCS OF WESTERN COALS; MEASUREMENTS OF RATES OF ASH BUILD-UP IN A LABORATORY FURNACE BURNING SELECTED COALS; AND ESTABLISHMENT OF THE MECHANISMS WHEREBY RAPID FOULING OCCURS TO DEVELOP NEW METHODS OF FIRESIDE ASH FOULING CONTROL.
REPORTS AND PUBLICATIONS:
(1)S. J. SELLE, P. H. TUFTE, ET AL. 'A STUDY OF THE ELECTRICAL RESISTIVITY OF FLY ASHES FROM LOW-SULFUR WESTERN COALS USING VARIOUS METHODS.' PRESENTED AT AIR POLLUTION CONTROL ASSOCIATION 65TH ANNUAL MEETING AT MIAMI BEACH, FL. PREPRINT NO. 7(2)107, JUNE 1972, 21 PP. (2) P. H. TUFTE, W. BECKERING. 'A PROPOSED MECHANISM OF ASH FOULING IN BURNING NORTH DAKOTA LIGNITE.' PRESENTED AT THE ANNUAL MEETING OF THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS, NOVEMBER 1971, NEW YORK; PREPRINT AVAILABLE.

00000134
PROJECT TITLE:
BASELINE DATA MONITORING FOR SELECTED ELEMENTS AND COMPOUNDS IN FLORA AND FAUNA OF EASTERN MONTANA COAL AREA

INVESTIGATORS:
C. C. GORDON
RESEARCH FACILITY:
UNIV. OF MONTANA, DEPT. OF BOTANY, ENVIRONMENTAL STUDIES LAB
MISSOULA, MT 59801
PRIMARY SPONSOR:
MONTANA DEPT. OF NATURAL RESOURCES & CONSERVATION
PRIMARY FUNDING AMOUNT:
1974 - 29,000
1975 - 2,000
TIME FRAME:
08 01 73 TO 08 01 74
LOCATION:
MT
ABSTRACT:

THE PURPOSES OF THIS STUDY ARE TO GENERATE A BASELINE DATA BANK OF FLUORIDE IN PLANTS AND ANIMALS AND SULFUR IN PLANTS, AND TO DETERMINE PRECIPITATION CHEMISTRY AT 35 LOCATIONS IN THE VICINITY OF A PROPOSED 21000 MW COAL-FIRED STEAM ELECTRIC GENERATING COMPLEX NEAR COLSTRIP, MONTANA. CHEMICAL ANALYSES WERE COMPLETED ON OVER 3500 PLANT AND 500 ANIMAL SPECIMENS. OVER 500 MICROSCOPE SLIDES OF PONDEROSA PINE NEEDLES WERE PREPARED. THE RESULTS ALLOWED THE CHARACTERIZATION OF THE FLUORIDE AND SULFUR CONTENT OF VEGETATION BY SEASON, SPECIES, AND AGE OF FOLIAGE. COMPARISONS BETWEEN DIFFERENT GROUPS OF PLANTS WERE MADE, AND FLUORIDE CONTENT OF ANIMALS AS A FUNCTION OF SPECIES AND AGE WAS DETERMINED. BOTH FLUORIDE AND SULFUR DECREASED OVER THE DORMANT PERIOD IN PINES. FLUORIDE INCREASED WITH THE AGE OF NEEDLES BUT SULFUR DID NOT. SULFATE CONCENTRATIONS RANGED FROM 0-20 MG/L IN PRECIPITATION, AND DAMAGE TO PINE NEEDLE BASES CAUSED BY ACID RAINS WAS OBSERVED.

REPORTS AND PUBLICATIONS:

A. TSAO AND G. J. WICKS. DRAFT ENVIRONMENTAL IMPACT STATEMENT ON COLSTRIP ELECTRIC GENERATING UNITS 3 AND 4, 5000 KILOVOLT TRANSMISSION LINES AND ASSOCIATED FACILITIES. ENERGY PLANNING DIV. MONTANA DEPT. OF NATURAL RESOURCES AND CONSERVATION, HELENA, MONTANA. NOVEMBER, 1974. VOL. 1-4.

00000135
PROJECT TITLE:
INVESTIGATION OF BIOENVIRONMENTAL IMPACT OF FOSSIL FUEL POWER PLANTS IN FORT UNION BASIN, MONTANA
INVESTIGATORS:
C. C. GORDON
RESEARCH FACILITY:
UNIV. OF MONTANA, DEPT. OF BOTANY, ENVIRONMENTAL STUDIES LAB
MISSOULA, MT 59801
PRIMARY SPONSOR:
U.S. ENVIRONMENTAL PROTECTION AGENCY
PRIMARY FUNDING AMOUNT:
1975 - 46,000
TIME FRAME:
08 01 74 TO 09 01 75
LOCATION:
MT
ABSTRACT:

THE PURPOSES OF THIS STUDY ARE TO ASSESS THE EFFECTS OF COAL-FIRED STEAM ELECTRIC POWER GENERATION ON FUNGAL AND INSECT POPULATIONS, ON PRECIPITATION CHEMISTRY, AND ON VEGETATION IN THE VICINITY OF COLSTRIP, MONTANA. STUDIES ARE BEING CONDUCTED ON GRASSLAND EXCLOSURES WHICH WILL BE IMPACTED BY THE POWER PLANT AND ON GRASSLAND EXCLOSURES TO BE STRESSED WITH SO(2) FUMIGATION AND WHICH IS OUTSIDE THE MAIN IMPACT AREA. CHEMICAL ANALYSES HAVE BEEN PERFORMED ON VEGETATION FROM ALL EXCLOSURES AND WILL BE CONTINUED. FUNGI HAVE BEEN CULTURED AND NATIVE VEGETATION WILL BE INNOCULATED AT ALL EXCLOSURES. INSECT SURVEYS HAVE BEEN CONDUCTED AT EXCLOSURES AND ON SURROUNDING AREAS. DAMAGE TO PINES BY INSECTS IS BEING ASSESSED. FOREST INSECT PESTS WILL BE CULTURED AND STRESSED BY SO(2) FUMIGATION. STUDIES DESIGNED TO DETERMINE THE EFFECTS OF SO(2) ON BEES WILL BE CONDUCTED AT SITES WHICH ARE TO BE STRESSED BY SO(2) FUMIGATION AND FROM NATIVE HIVES IN THE HIGH IMPACT AREAS. CHEMICAL ANALYSES FOR FLUORIDE AND SULFUR DIOXIDE HAVE BEEN PERFORMED AND WILL BE CONTINUED ON BEES COLLECTED IN THE COLSTRIP AREA.

00000136
PROJECT TITLE:
EVALUATE ENVIRONMENTAL IMPACT OF 40-MEGAWATT OIL-FIRED POWER PLANT ON ECOSYSTEMS
INVESTIGATORS:
C. C. GORDON
RESEARCH FACILITY:
UNIV. OF MONTANA, DEPT. OF BOTANY, ENVIRONMENTAL STUDIES LAB
MISSOULA, MT 59801
PRIMARY SPONSOR:
BROOKHAVEN NATIONAL LABORATORY
PRIMARY FUNDING AMOUNT:
1975 - 6,000
TIME FRAME:
11 01 74 TO 01 01 75
LOCATION:
NY MT
ABSTRACT:

THE PURPOSE OF THIS PROPOSED RESEARCH WAS TO DETERMINE THE EFFECTS OF BROOKHAVEN NATIONAL LABORATORY'S 40 MEGAWATT OIL-FIRED POWER PLANT ON VEGETATION. COLLECTIONS WERE MADE AT BNL, ON THE NORTH AND SOUTH SHORES OF LONG ISLAND, AND ON THE CONNECTICUT SHORE OF LONG ISLAND SOUND. CHEMICAL MEASUREMENTS FOR FLUORIDE AND SULFUR WERE MADE ON THE SAMPLES AND HISTOLOGICAL STUDIES DID NOT SHOW ANY IMPACT FROM THE BNL POWER PLANT EXCEPT AT VERY SHORT DISTANCES. VEGETATION FROM ALL COLLECTIONS WAS ACCUMULATING EXCESS SULFUR, BUT NOT

FLUORIDE. BASAL NEEDLE NECROSIS AND PREMATURE NEEDLE CASTING OF PINES CAUSED BY ACID RAINS OR PARTICULATE WAS OBSERVED AT ALL VEGETATION COLLECTING SITES.
REPORTS AND PUBLICATIONS:
C. C. GORDON AND P. C. TOURANGEAU. ´DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR BROOKHAVEN NATIONAL LABORATORY FORTY MEGAWATT STEAM GENERATING PLANT.´ PREPARED FOR ASSOCIATED UNIVERSITIES, INC. UPTON, NY. ENVIRONMENTAL STUDIES LAB. UNIV. OF MONTANA, MISSOULA, MT 59801. DECEMBER 23, 1974.

00000137
PROJECT TITLE:
METEOROLOGICAL STUDIES AT SITES FOR FUTURE COAL FIRED POWER PLANTS
INVESTIGATORS:
R. ELLIOTT
RESEARCH FACILITY:
NORTH AMERICAN WEATHER CONSULTANTS
SANTA BARBARA MUNICIPAL AIRPORT
GOLETA, CA 93017
PRIMARY SPONSOR:
UTAH POWER & LIGHT CO.
PRIMARY FUNDING AMOUNT:
1972 - 67,000
1973 - 143,000
1974 - 59,000
TIME FRAME:
01 01 69 - CONTINUING
LOCATION:
UT WY
ABSTRACT:
THIS RESEARCH INCLUDES SETTING UP OF WEATHER STATIONS AND OTHER APPARATUS TO COLLECT METEOROLOGICAL DATA AT FUTURE POWER PLANT SITES. VARIOUS TRACER AND AERIAL STUDIES HAVE BEEN CONDUCTED TO PREDICT PARTICULATE, SO2 AND OTHER EMISSION FLOWS.

00000138
PROJECT TITLE:
AIR AND VEGETATION MONITORING
INVESTIGATORS:
T. ABEGG
RESEARCH FACILITY:
UNIV. OF UTAH
UTAH ENGINEERING EXPERIMENT STATION
SALT LAKE CITY, UT 84110
PRIMARY SPONSOR:
UTAH POWER & LIGHT CO.
PRIMARY FUNDING AMOUNT:
1972 - 86,000
1973 - 54,000
1974 - 82,000
TIME FRAME:
01 01 69 - CONTINUING
LOCATION:
UT WY
ABSTRACT:
THE OBJECTIVE IS TO CONTINUE AIR AND VEGETATION STUDIES IN THE HUNTINGTON CANYON TO ESTABLISH PRE-OPERATIONAL BACKGROUND CONDITIONS.

00000139
PROJECT TITLE:
JIM BRIDGER ELECTRIC THERMAL PLANT & ECOLOGICAL STUDIES
INVESTIGATORS:
M. MAY; L. PAINTER
RESEARCH FACILITY:
UNIV. OF WYOMING
PLANT SCIENCE DIVISION; COLLEGE OF AGRICULTURE
LARAMIE, WY 82070
PRIMARY FUNDING AMOUNT:
1971 - 8,265
1972 - 8,164
1973 - 8,534
1974 - 9,061
TIME FRAME:
02 01 72 TO 02 01 78
LOCATION:
WY
ABSTRACT:
OBJECTIVES: (1)TO INVENTORY THE VEGETATION, SOIL AND WILDLIFE RESOURCE AND TO ESTABLISH NORMS FOR A THREE YEAR PERIOD PRIOR TO OPERATION OF THE FIRST UNIT OF THE JIM BRIDGER POWER PLANT; (2) TO RE-EVALUATE THESE RESOURCES FOR THREE YEARS AFTER INITIAL OPERATION OF THE JIM BRIDGER POWER PLANT; (3)TO DETERMINE IF ANY CHANGE BETWEEN THE PRE-OPERATIONAL AND POST-OPERATIONAL PERIOD IS DIRECTLY THE RESULT OF THE PLANT OPERATION.
REPORTS AND PUBLICATIONS:
THREE PROGRESS REPORTS TO DATE.

00000140
PROJECT TITLE:
DAVE JOHNSTON AMBIENT AIR MONITORING
INVESTIGATORS:
E. J. KAPLIN
RESEARCH FACILITY:
YORK RESEARCH CORP.
ONE RESEARCH DRIVE
STAMFORD, CT 06906
PRIMARY SPONSOR:
PACIFIC POWER & LIGHT CO.

PRIMARY FUNDING AMOUNT:
PROPRIETARY
TIME FRAME:
07 01 72 TO INDEFINITE
LOCATION:
WY
ABSTRACT:
THE INTENT OF THIS WORK IS TO PROVIDE: (A) CONTINUOUS AIR QUALITY OBSERVATION OF THE REGION AROUND DAVE JOHNSTON STEAM ELECTRIC PLANT; (B) PROFESSIONAL CONSULTING SERVICES FOR ANALYSIS AND REPORTING OF DATA COLLECTED.

00000141
PROJECT TITLE:
ABATEMENT OF POWERPLANT AIR POLLUTION FROM LIGNITE AND WESTERN COALS - MANAGING COAL WASTES AND POLLUTANTS, PROJECT G-4
INVESTIGATORS:
G. H. GRONHOVD; E. A. SONDREAL
RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
GRAND FORKS ENERGY RESEARCH LABORATORY
BOX 8213, UNIVERSITY STATION
GRAND FORKS, ND 58201
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
PROPRIETARY
TIME FRAME:
01 01 72 TO INDEFINITE
LOCATION:
ND
ABSTRACT:
THE OBJECTIVE OF THIS PROJECT IS TO DEVELOP TECHNIQUES FOR REDUCING AIR POLLUTION FROM THE COMBUSTION OF LIGNITE AND WESTERN COALS. THE WET SCRUBBER PROJECT WILL BE CONTINUED WITH SPECIAL EMPHASIS PLACED ON OPTIMUM SO2 REMOVAL, SCALING, SOLID WASTE DISPOSAL AND ECONOMIC EVALUATION. BOTH BENCH-SCALE WORK AND PILOT PLANT STUDIES WILL BE CONDUCTED AT THE BUREAU S LABORATORY. THE BUREAU WILL ALSO PARTICIPATE IN FIELD TESTS UNDERTAKEN BY INDUSTRIAL COOPERATORS. INVESTIGATION WILL BE CONTINUED IN FLY-ASH COLLECTION IN A PILOT ELECTROSTATIC PRECIPITATOR. IN ADDITION NO(X) EMISSIONS WILL BE MEASURED FROM A PILOT COMBUSTOR.

00000142
PROJECT TITLE:
IMPLICATIONS OF SIMULATED LEVELS OF COAL DEVELOPMENT ON THE ATMOSPHERIC ENVIRONMENT AND PLANT ECOSYSTEMS OF SELECTED SITES IN THE NORTHERN GREAT PLAINS
PROJECT NUMBER:
16-418-GR
INVESTIGATORS:
DR. JUANITO M. RAMIREZ
SOILS DEPT.
NORTH DAKOTA STATE UNIV.
FARGO, ND 58102
PROJECT SUPERVISOR:
ARDELL J. BJUGSTAD
RM-1711
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECH.
RAPID CITY, SD 57701
COOPERATOR/COORDINATOR:
NORTHERN GREAT PLAINS RESOURCE PROGRAM; NORTH DAKOTA STATE PLANNING DIV.; WATER RESOURCES INSTITUTES OF ND, MT, WY; SOUTH DAKOTA SCHOOL OF MINES & TECH., IAS; NORTH DAKOTA STATE HIGHWAY DEPT.; BASIN ELECTRIC POWER COMPANY; CONSOLIDATION COAL CO.
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
170,000
TIME FRAME:
06 30 74 TO 01 31 77
LOCATION:
ND
ABSTRACT:
PROBLEM: KNOWLEDGE IS LACKING ABOUT THE CHANGES IN THE CLIMATOLOGY OF LOW-LEVEL ATMOSPHERIC CONDITIONS AND IMPACT ON ECOSYSTEM CAUSED BY AIR POLLUTION PROBLEMS FROM COAL DEVELOPMENT IN NORTH DAKOTA. THIS INFORMATION IS NEEDED AS A DATA BASE FOR DECISION-MAKING RELATED TO LOCATION SITING OF COAL COMBUSTION PLANTS, DESIGN AND OPERATION OF EFFLUENT STACKS TO MINIMIZE ENVIRONMENTAL DEGRADATION. OBJECTIVES: THE OBJECTIVES ARE TO: 1. CHARACTERIZE THE FREQUENCY, INTENSITY AND DURATION OF LOW-LEVEL RADIATION INVERSIONS AT EXISTING AND PROPOSED COAL DEVELOPMENT SITES IN THE STANTON-BEULAH AREA, NORTH DAKOTA; 2. SIMULATE THE PROBABLE DISPERSION OF WATER EFFLUENTS TO THE ATMOSPHERE FROM VARIOUS OPERATIONAL LEVELS, AND TECHNIQUES OF COAL DEVELOPMENT IN NORTH DAKOTA; AND 3. DETERMINE THE EFFECTS OF THE PROBABLE CHANGES IN AIR QUALITY ON PLANT ECOSYSTEMS. METHODS: TOWERS INSTRUMENTED WITH THERMOMETERS AND ANEMOMETERS WILL RECORD TEMPERATURE AND WIND PROFILES WILL PROVIDE DATA TO ANALYZE 1) FREQUENCY OF RADIATION INVERSIONS OF DIFFERENT INTENSITIES , DURATION AND DEPTHS, 2) DIURNAL COMMENCEMENT TIMES OF INVERSIONS, 3) SEASONAL DISTRIBUTION OF RADIATION INVERSION, AND 4) RATES OF RADIATION INVERSION DECAY. ECOSYSTEM RESPONSES WILL BE MEASURED THROUGH USE OF PERMANENT PLOTS

ESTABLISHED IN NATIVE MIXED-GRASS PRAIRIE, NATIVE WOODLANDS AND ASSOCIATED AQUATIC PLANT COMMUNITIES. FLORISTIC COMPOSITION, FREQUENCY, BASAL AREA, PRODUCTIVITY AND SUCCESSIONAL TRENDS WILL BE DETERMINED. GREENHOUSE AND GROWTH CHAMBER EXPERIMENTS WILL BE PERFORMED TO DETERMINE EFFECTS OF AIR POLLUTANTS.

REPORTS AND PUBLICATIONS:

WORK PLAN: JUNE 14, 1974
PROGRESS MAY 1975 AND 1976. FINAL: JANUARY 1977.

00000143

PROJECT TITLE:

THE BLACK HILLS AS A GREEN AREA SINK FOR ATMOSPHERIC POLLUTANTS

PROJECT NUMBER:

16-419-CA

INVESTIGATORS:

BRYANT L. DAVIS, GEOPHYSICIST

PROJECT SUPERVISOR:

HOWARD K. ORR, HYDROLOGIST
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECH.
RAPID CITY, SD 57701

COOPERATOR/COORDINATOR:

SOUTH DAKOTA SCHOOL OF MINES & TECH.; BLACK HILLS NATIONAL FOREST

PRIMARY SPONSOR:

SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468

PRIMARY FUNDING AMOUNT:

13,246

SECONDARY FUNDING AMOUNTS:

5769

TIME FRAME:

01 01 74 TO 12 30 75

LOCATION:

SD

ABSTRACT:

PROBLEM: WHAT ARE BASE LEVELS AND POTENTIAL EFFECTS OF AIRBORNE PARTICULATES IN AND AROUND THE BLACK HILLS THAT MAY BE INFLUENCED BY STACK EFFLUENTS FROM PLANNED POWER PLAN DEVELOPMENTS IN UPWIND AREAS OF NORTHEAST WYOMING. OBJECTIVES: DETERMINE THE FILTERING AND REMOVAL GREEN AREA) EFFECT OF THE BLACK HILLS; AND ESTABLISH BASE LEVELS OF AIRBORNE PARTICULATES IN DIFFERENT PARTS OF THE BLACK HILLS. METHODS: OBTAIN CLIMATIC DATA AND SMALL PARTICLE COUNTS AT 13 STATIONS IN AND AROUND THE BLACK HILLS AT TWO-WEEK INTERVALS. SAMPLING OF STACK EFFLUENTS NEAR EXISTING POWER PLANTS AND ANALYSIS OF PARTICLE SIZE AND COMPOSITION. STATISTICAL ANALYSIS: TIME TRENDS AND AVERAGES.

REPORTS AND PUBLICATIONS:

B. L. DAVIS ET AL. THE BLACK HILLS AS A GREEN AREA SINK FOR ATMOSPHERIC POLLUTANTS (FIRST ANNUAL REPORT). REPORT 75-8, INSTITUTE OF ATMOSPHERIC SCIENCES, SOUTH DAKOTA SCHOOL OF MINES AND TECH., RAPID CITY, SD. MAY 1975.

00000144

PROJECT TITLE:

PRESENT CONDITIONS OF THE AQUATIC BIOTA AND ABIOTA OF THE LITTLE POWDER RIVER IN THE THUNDER BASIN NATIONAL GRASSLAND, WYOMING.

PROJECT NUMBER:

COOP AGREEMENT 16-416-CA-RWU-FS-RM-1703

INVESTIGATORS:

THOMAS A. WESCHE; ROBERT D. KERR
WATER RESOURCES RESEARCH INSTITUTE
UNIVERSITY OF WYOMING
LARAMIE, WY 82006

PROJECT SUPERVISOR:

JOHN F. THILENIUS
FOREST RESEARCH LAB.
UNIVERSITY STATION BOX 3313
LARAMIE, WY 82006

COOPERATOR/COORDINATOR:

MEDICINE BOW NATIONAL FOREST(THUNDER BASIN NATL GRASSLAND)

PRIMARY SPONSOR:

SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468

PRIMARY FUNDING AMOUNT:

8000

TIME FRAME:

06 01 74 TO 02 28 75

LOCATION:

WY

ABSTRACT:

PROBLEM: INCREASING STATE, REGIONAL, AND NATIONAL INTEREST IS PRESENTLY BEING SHOWN IN THE DEVELOPMENT OF THE COAL DEPOSITS UNDERLYING THE POWDER RIVER BASIN OF WYOMING. A PORTION OF THESE DEPOSITS IS ON THE THUNDER BASIN NATIONAL GRASSLAND. AT PRESENT, LAND USE IN THIS AREA IS PRIMARILY UPON GRASSLAND AGRICULTURE. IN THE FUTURE, SUCH USE MAY CHANGE AS RESOURCE DEVELOPMENT INCREASES THROUGH SURFACE MINING. AS LAND USE CHANGES, SO WILL THE AQUATIC ENVIRONMENT OF THE AREA. IT IS NECESSARY TO INVENTORY THE PRESENTLY EXISTING AQUATIC CONDITIONS AND TO MONITOR THE CHANGES WHICH OCCUR AS COAL DEVELOPMENT PROCEEDS SO THAT SUITABLE BASELINE DATA WILL BE AVAILABLE TO BETTER

EVALUATE THE POST-DEVELOPMENT REHABILITATION ALTERNATIVES.

OBJECTIVES: THE OBJECTIVE OF THIS STUDY IS TO INVENTORY THE NATIVE BENTHIC FAUNA, FISH POPULATIONS, AND WATER CHEMISTRY OF THAT PORTION OF THE LITTLE POWDER RIVER WHICH FLOWS THROUGH THE SPRING CREEK UNIT OF THE THUNDER BASIN NATIONAL GRASSLAND IN CAMPBELL COUNTY, WYOMING, AND IS DOWNSTREAM FROM SEVERAL PROPOSED COAL MINING DEVELOPMENTS.

METHODS: SAMPLING STATIONS HAVE BEEN ESTABLISHED ON THE LITTLE POWDER RIVER AT THREE LOCATIONS. BOTTOM FAUNA SAMPLING WILL BE CONDUCTED BY MEANS OF A SURBER FOOT-SQUARE SAMPLER AND/OR ECKMAN DREDGE TO DETERMINE THE RELATIVE ABUNDANCE OF INVERTEBRATES PRESENT. SAMPLING WILL BE CONDUCTED DURING THE SPRING, THE SUMMER, AND THE FALL OF 1974 TO DETERMINE SEASONAL CHANGES IN THE ABUNDANCE OF ORGANISMS. ALL SAMPLES WILL BE ANALYZED AT THE UNIVERSITY OF WYOMING AND IDENTIFIED TO THE LOWEST TAXONOMIC GROUP POSSIBLE, USING AVAILABLE KEYS. FISH POPULATIONS WILL BE SAMPLED BY ELECTROFISHING AND/OR SEINING IN THE SUMMER AND FALL TO DETERMINE THE SPECIES PRESENT AND THEIR RELATIVE ABUNDANCE. WATER WILL BE STUDIED TO DETERMINE PRESENT WATER QUALITY BOTH AT THE SOURCES AND IN THE RIVER PROPER. THE INITIAL THRUST WILL BE TO PROVIDE A WATER INVENTORY WITH BASE CONDITIONS RECORDED FOR GROUND AND SURFACE SOURCES. CLASSIFICATIONS OF WATER IN THE AREA WILL INCLUDE: SURFACE WATER; GROUND WATER; NATURAL RUNOFF; PRODUCED WATER; STORED WATER; SEEPS AND SINKS. A NETWORK OF WATER QUALITY MONITORING STATIONS WILL BE ESTABLISHED WITHIN THE THUNDER BASIN NATIONAL GRASSLAND BOUNDARIES. SAMPLES WILL BE COLLECTED AT MONTHLY INTERVALS, WITH DETERMINATIONS MADE FOR THE FOLLOWING PARAMETERS: DISSOLVED OXYGEN; SPECIFIC CONDUCTANCE; TOTAL DISSOLVED SOLIDS; CHLORIDES; SULFATES; SODIUM; BORON; HEAVY METALS; CATION-ANION BALANCE.

STATISTICAL ANALYSES: CHANGE IN BIOTIC ORGANISMS CONJUNCTION WITH DUNCAN´S NEW MULTIPLE RANGE TEST.

REPORTS: PROGRESS REPORTS NOT REQUIRED UNDER COOPERATIVE AGREEMENT. FINAL REPORT DUE FEBRUARY 28, 1975.

REPORTS AND PUBLICATIONS:

T. A. WESCHE, R. D. KERR, D. BALDRIDGE. AQUATIC BIOTIC AND ABIOTA OF THE LITTLE POWDER RIVER IN THUNDER BASIN NATIONAL GRASSLAND. UNIV. OF WYOMING, WATER RESOURCES RESEARCH INST. LARAMIE, WY, FEB. 1975.

00000145

PROJECT TITLE:

TRACE ELEMENT EFFECTS OF ENERGY CONVERSION FACILITIES

PROJECT NUMBER:

10570168

PROJECT SUPERVISOR:

NORTH DAKOTA STATE DEPT. OF HEALTH
DIVISION OF ENVIRONMENTAL ENGINEERING
GENE A. CHRISTIANSON, DIRECTOR
STATE CAPITOL BUILDING
BISMARCK, ND 58505
701-224-2374

PRIMARY SPONSOR:

OLD WEST REGIONAL COMMISSION
DR. KENNETH A. BLACKBURN
PRATT BUILDING, SUITE 306A
BILLINGS, MT 59101
406-245-6711 X6665

PRIMARY FUNDING AMOUNT:

100,000
FY 76 - 55,000
FY 77 - 45,000

TIME FRAME:

06 25 75 TO 06 30 77

LOCATION:

ND

ABSTRACT:

THE PROJECT WILL EXAMINE THE FOOD CHAIN ASPECT OF TRACE ELEMENTS EMISSIONS FROM ENERGY CONVERSION FACILITIES. THE INFORMATION DERIVED FROM THIS STUDY AS WELL AS RELATED ON-GOING PROJECTS SCHEDULED FOR COMPLETION IN THE NEAR FUTURE WILL BE UTILIZED TO ACHIEVE THE FOLLOWING PROJECT OBJECTIVES AND ADDRESS THE FOLLOWING MAJOR RESEARCH QUESTIONS: (1) TO DETERMINE POTENTIAL PROBLEM TRACE ELEMENT CHEMICALS IN COAL; (2)TO DETERMINE THE CHEMICAL PROFILE OF SOILS; (3)TO DETERMINE THE RATE AND CONCENTRATION BUILDUP OF TRACE ELEMENTS IN THE SOIL RESERVOIR FROM EXISTING COAL FIRED POWER PLANTS; (4)TO DETERMINE, VIA MODELING OF AIR EMISSIONS OF TRACE ELEMENTS, PROJECTED SOIL RESERVOIR BUILD-UP OF TRACE ELEMENTS; (5) TO EXAMINE THE NEED FOR DEVELOPMENT OF SPECIALIZED CONTROL PROCEDURES FOR TRACE ELEMENT WASTES FROM ENERGY CONVERSION FACILITIES.

MAJOR RESEARCH QUESTIONS: (1)WHAT IS THE PROPER PERSPECTIVE ON THE QUESTION OF TRACE ELEMENT EMISSIONS FROM ENERGY CONVERSION? (2)WHAT ARE THE REASONABLE AND EFFECTIVE ENVIRONMENTAL REGULATIONS FOR CONTROLLING THOSE TRACE ELEMENTS WHICH CONSTITUTE A POTENTIAL SOIL CONTAMINATION PROBLEM? (3) WHAT INFORMATION IS USEFUL IN DETERMINING ENVIRONMENTAL POLICIES WITHIN THE REGION AND HOW CAN THIS INFORMATION BE UTILIZED? (4) WHAT IS THE FEASIBILITY OF ENVIRONMENTAL REGULATORY AGENCIES USING SOIL AND VEGETATION INDICATORS FOR LONG-TERM MONITORING OF EMISSIONS FROM ENERGY CONVERSION FACILITIES?

00000146

PROJECT TITLE:

A STUDY OF POWER PLANT PLUMES TO DETERMINE THEIR COMPOSITION, TRANSPORT AND DISPERSION AND EVALUATE THE POTENTIAL FOR POSSIBLE MODIFICATION OF WEATHER ON THE MESOSCALE.

INVESTIGATORS:
JOHN D. MARWITZ; W. A. COOPER; D. L. VEAL
PROJECT SUPERVISOR:
UNIVERSITY OF WYOMING, DEPT. OF ATMOSPHERIC SCIENCE
DR. D. L. VEAL
UNIVERSITY STATION, BOX 3038
LARAMIE, WY 82071
307-766-3245
PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
DR. KENNETH A. BLACKBURN
PRATT BUILDING, SUITE 306A
BILLINGS, MT 59101
406-245-6711
PRIMARY FUNDING AMOUNT:
75,000
TIME FRAME:
06 01 75 TO 11 30 76
LOCATION:
MT ND WY
ABSTRACT:

OBJECTIVES: A. OBSERVE THE COMPOSITION, TRANSPORT AND DISPERSION OF PLUMES FROM LARGE POWER PLANTS UNDER A VARIETY OF STABILITY, WIND SHEAR AND TOPOGRAPHIC CONDITIONS. B. FROM THESE OBSERVATIONS CONSTRUCT MODELS OF THE HORIZONTAL AND VERTICAL TRANSPORT AND DISPERSION OF THE PLUMES. C. DETERMINE THE POSSIBILITIES OF SENSIBLE HEAT, LATENT HEAT, CLOUD MICROPHYSICS PROPERTIES AND RADIATION PROPERTIES MODIFYING THE WEATHER ON THE MESOSCALE. OBSERVATIONS OF THE PLUMES AND THEIR ENVIRONMENT FROM THREE POWER PLANTS FOR ONE WEEK PER PLANT IN THE WINTER. ONE COAL-FIRED ELECTRICAL POWER PLANT IN THE 500-1000 MW SIZE CLASS NOW OPERATING WILL BE OBSERVED IN EACH OF THE STATES OF WYOMING, MONTANA AND NORTH DAKOTA. THE RESEARCH SHALL ADDRESS THE FOLLOWING MAJOR QUESTIONS WITH THE MEASUREMENTS OBTAINED: A. IS THERE A POTENTIAL FOR SIGNIFICANT WEATHER MODIFICATION RESULTING FROM THE OPERATION OF POWER PLANTS? B. IF SO, UNDER WHAT CONDITIONS WOULD THIS MODIFICATION OCCUR, AND HOW SERIOUS WOULD IT BE? C. IF THERE IS A POTENTIAL FOR WEATHER MODIFICATION, HOW CAN COUNTER-MEASURES BE TAKEN TO MINIMIZE ITS EFFECTS?

00000147
PROJECT TITLE:
EFFECTS OF AIR POLLUTION ON NATIVE PLANTS AND CROPS OF WYOMING
PROJECT NUMBER:
WYO. 123-76
INVESTIGATORS:
GEORGE H. BRIDGMON; ROBERT L. LANG
PROJECT SUPERVISOR:
GEORGE H. BRIDGMON
UNIV. OF WYOMING
P.O. BOX 3354, UNIVERSITY STATION
LARAMIE, WY 82071
307-766-2248
PRIMARY SPONSOR:
UNIVERSITY OF WYOMING, PLANT SCIENCE DIVISION
P.O. BOX 3354, UNIVERSITY STATION
LARAMIE, WY 82071
307-766-3103
PRIMARY FUNDING AMOUNT:
FY 76 - 8161
TIME FRAME:
07 01 75 TO 06 30 80
LOCATION:
WY
ABSTRACT:

MANY PEOPLE IN WYOMING ARE CONCERNED ABOUT AIR POLLUTION IN THE AREAS SURROUNDING THE LARGE COAL-FIRED POWER GENERATING PLANTS. THIS MAY OR MAY NOT BE JUSTIFIABLE. GENERATING PLANTS ARE NOW OPERATING AND MANY MORE ARE UNDER CONSTRUCTION, OFTEN NEAR STRIPPABLE COAL AND WATER RESOURCES. PRELIMINARY RESEARCH, UNDER THE WYO. 69-0072 PROJECT, INDICATES THAT THE NATIVE VEGETATION IN SOUTHWEST WYOMING IS VERY RESISTANT TO SO2 INJURY. FURTHER STUDIES IN THIS AND OTHER AREAS OF WYOMING SHOULD DETERMINE IF POLLUTION STANDARDS OF SO2 AND OTHER OXIDANTS AND PARTICULATES ARE MORE OR LESS SEVERE THAN NECESSARY. OTHER AREAS IN WYOMING HAVE SLIGHTLY GREATER RAINFALL AND HUMIDITY AND A GREATER VARIATION IN OTHER NATIVE AND CROP PLANTS BUT LITTLE IS KNOWN AS TO THEIR SUSCEPTIBILITY TO SO2 AND OTHER POLLUTANT INJURIES UNDER THE VARIATION THAT EXISTS BETWEEN DESERT, MOUNTAIN AND PLAINS CONDITIONS OF WYOMING. TO DETERMINE ACUTE INJURY SYMPTOMS OF SO2 AND OTHER POLLUTANTS ON VARIOUS CROP AND NATIVE PLANTS OF WYOMING AND IN AREAS WHERE SUCH POLLUTION IS ANTICIPATED. TO APPRAISE FACTORS WHICH INFLUENCE THE AMOUNG OF DAMAGE TO PLANTS BY FUMIGATION, I. E. TEMPERATURE, RELATIVE HUMIDITY, PRESENCE OF MOISTURE, ETC. TO SELECT INDICATOR PLANTS THAT SHOW MORE SUSCEPTIBILITY TO INJURY IN AREAS OF THE STATE AS VISUAL INDICATORS OF POLLUTION DAMAGE. APPROACH: FUMIGATION OF MANY PLANT SPECIES WILL BE MADE IN BOTH CLOSED AND OPEN TOP CHAMBERS FOR VARIOUS PERIODS OF TIMES AT VARYING MEASURED RATES OF SO2 OR OTHER POLLUTANTS. A. READINGS ON SYMPTOMS OF INJURY WILL BE DETERMINED AFTER FUMIGATION TO DETERMINE DOSE-RESPONSE-TIME AND RECOVERY-TIME. B. PHOTOGRAPHIC RECORDS WILL BE MADE OF THE VEGETATION AND DAMAGE AFTER EXPOSURE. RECORDS WILL BE KEPT ON CONCENTRATIONS OR AMOUNTS OF GAS OR POLLUTANTS, TIME OF EXPOSURE, SPECIES OF PLANTS, GROWTH STAGE, TEMPERATURE, HUMIDITY, AVAILABLE MOISTURE, CONDITION OF PLANTS AND TYPES OF DAMAGE CAUSED (SYMPTOMS). FUMIGATION WILL BE MADE ON BOTH NATIVE SPECIES AND MANY CROP PLANTS INCLUDING INTRODUCED VEGETABLES AND ORNAMENTAL PLANTS TO DETERMINE MOST SUSCEPTIBLE AND THUS THE BEST INDICATOR PLANTS IN THE AREA.

00000148

PROJECT TITLE:
HERBAGE STRUCTURE, PRODUCTION AND PHENOLOGY MONITORING

INVESTIGATORS:
H. G. FISSER; JERRY COX

PROJECT SUPERVISOR:
H. G. FISSER
UNIV. OF WYOMING
P.O. BOX 3354, UNIVERSITY STATION
LARAMIE, WY 82071
307-766-5130

PRIMARY SPONSOR:
ATLANTIC RICHFIELD CO.
DON MCSPARRAN
1500 SECURITY LIFE BUILDING, 1616 GLENARM
DENVER, CO 80202
303-266-3741

PRIMARY FUNDING AMOUNT:
1975 - 27,300

TIME FRAME:
07 01 74 TO 12 31 77

LOCATION:
WY

ABSTRACT:
1. TO RECORD VEGETATION STRUCTURE AND HERBAGE PRODUCTION DATA WITHIN EACH OF 10 VEGETATION TYPE AREAS (22 CLUSTER LOCATIONS). 2. TO ESTABLISH BASE LINE PARAMETERS OF VEGETATION STRUCTURE AND HERBAGE PRODUCTION FOR EACH OF THE 10 VEGETATION TYPE AREAS. 3. TO DEVELOP STATISTICAL DESIGNS FOR EVALUATION OF VEGETATION DATA.

REPORTS AND PUBLICATIONS:
H. G. FISSER, F. TAHA, ET AL. 1975. HERBAGE STRUCTURE, PRODUCTION AND PHENOLOGY ON BLACK THUNDER. WYOMING AG. EXP. STATION SCIENTIFIC REPORT NO. 662. 118 PP.

00000149

PROJECT TITLE:
EFFECTS OF COAL EXTRACTION AND RELATED DEVELOPMENTS ON WILDLIFE POPULATION

PROJECT SUPERVISOR:
ROBERT PHILLIPS
U.S. FISH AND WILDLIFE SERVICE
DENVER FEDERAL CENTER
DENVER WILDLIFE RESEARCH CENTER
DENVER, CO 80225
303-549-3212

PRIMARY SPONSOR:
U.S. FISH AND WILDLIFE SERVICE
ROBERT STEWART
OFFICE OF BIOLOGICAL SERVICES
WASHINGTON, DC 20240
202-343-8095

PRIMARY FUNDING AMOUNT:
9,000

TIME FRAME:
02 01 75 TO INDEFINITE

LOCATION:
MT

ABSTRACT:
AN INVESTIGATION OF METHODS OF EVALUATING WILDLIFE HABITAT AND POPULATIONS IN AN AREA OF COAL DEVELOPMENT IN SOUTHEASTERN MONTANA.
THE FOUR SEGMENTS ARE STUDIES OF:
1. PREDATOR POPULATIONS IN RELATIONSHIP TO PREY ABUNDANCE.
2. UNGULATE MOVEMENTS, HABITAT USE, AND BEHAVIOR RESPONSE TO COAL MINING.
3. SEASONAL HABITAT REQUIREMENTS OF SHARPTAIL AND SAGE GROUSE.
4. DISTRIBUTION AND ABUNDANCE OF NONGAME BIRDS AS RELATED TO HABITAT TYPE.

00000150

PROJECT TITLE:
DISTRIBUTION AND ABUNDANCE OF BREEDING BIRDS ON SURFACE MINABLE COAL LANDS IN THE NORTHERN GREAT PLAINS

PROJECT SUPERVISOR:
DR. JOSEPH HICKEY
UNIV. OF WISCONSIN
DEPT. OF WILDLIFE ECOLOGY
MADISON, WI 53715
602-262-2671

PRIMARY SPONSOR:
U.S. FISH AND WILDLIFE SERVICE
ROBERT STEWART
OFFICE OF BIOLOGICAL SERVICES
WASHINGTON, DC 20240
202-343-8095

PRIMARY FUNDING AMOUNT:
50,000

TIME FRAME:
07 01 75 TO 06 30 79

LOCATION:
MT

ABSTRACT:
TO CALCULATE NONGAME BREEDING BIRD DENSITIES ON AT LEAST SEVEN HABITAT TYPES IN SOUTHEASTERN MONTANA. TO DETERMINE NONGAME BREEDING BIRD DENSITIES ON RECLAIMED SPOIL LANDS. TO DEVELOP RAPID METHODS OF DETERMINING BREEDING BIRD DENSITIES IN THESE HABITATS.

00000151

PROJECT TITLE:
IMPACT OF ENERGY DEVELOPMENT OF THE WILDLIFE OF NORTHEASTERN WYOMING, NORTHWESTERN SOUTH DAKOTA, AND SOUTHEASTERN MONTANA

PROJECT SUPERVISOR:
DR. FRANK SCHITOSKEY
SOUTH DAKOTA STATE UNIV.
FISH & WILDLIFE COOPERATIVE UNIT
BROOKINGS, SD 57006
605-688-6121

PRIMARY SPONSOR:
U.S. FISH AND WILDLIFE SERVICE
ROBERT STEWART
OFFICE OF BIOLOGICAL SERVICES
WASHINGTON, DC 20240
202-343-8095

PRIMARY FUNDING AMOUNT:
175,000

TIME FRAME:
07 01 75 TO 06 30 79

LOCATION:
WY MT SD

ABSTRACT:
DEVELOP BASELINE INFORMATION AND METHODOLOGIES TO ASSESS REGIONAL IMPACTS OF COAL PROCESSING. THIS STUDY, CONDUCTED IN WYOMING, MONTANA, AND SOUTH DAKOTA, WILL DEVELOP A SIMULATION MODEL OF WILDLIFE AND ENERGY DYNAMICS OF A SHORT PRAIRIE ECOSYSTEM.

00000152

PROJECT TITLE:
COST BENEFIT AND IMPROVED FUEL USE THROUGH TIME-VARIABLE ATMOSPHERIC DISPERSION POTENTIAL: AN ASSESSMENT IN RELATION TO POLLUTION CONTROL

PROJECT NUMBER:
75-15168

PROJECT SUPERVISOR:
GLENN R. HILST
TRC, 125 SILAS DEANE HIGHWAY
WEATHERSFIELD, CT 06109

PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION
RALPH M. PERHAC
1800 G ST. NW
WASHINGTON, DC 20550
202-632-5970

SECONDARY SPONSOR:
ELECTRIC POWER RESEARCH INST. (EPRI)
HARRY KORNBERG
3412 HILLVIEW AVE.
P.O. BOX 10412
PALO ALTO, CA 94304
415-493-4800

PRIMARY FUNDING AMOUNT:
75,000

SECONDARY FUNDING AMOUNT:
75,000

TIME FRAME:
06 01 75 TO 05 31 76

LOCATION:
CT MT

J3706

1.4 ATMOSPHERIC AND BIOENVIRONMENTAL STUDIES

ABSTRACT:

THE PURPOSE OF THIS WORK IS TO EVALUATE THE LIKELIHOOD OF USING THE NATURAL DISPERSION PROPERTY OF THE ATMOSPHERE FOR REDUCING AIR POLLUTION FROM POWER PLANTS. SPECIFICALLY, THE TIME VARIABILITY OF DISPERSION WILL BE MEASURED IN ORDER TO DESIGN A PROGRAM OF FUEL SWITCHING (HIGH TO LOW SULFUR COAL) AND MINIMUM USE OF CONTROL DEVICES. BY IMPLEMENTING SUCH A PROGRAM, MONEY CAN BE SAVED THROUGH LESS FREQUENT OPERATION OF POLLUTION CONTROL DEVICES. AND VALUABEL LOW-SULFUR COAL CAN BE USED SPARINGLY. THE WORK WILL CENTER AROUND A POWER PLANT SITE AT COLSTRIP, MONTANA. THIS IS AN AREA UNDERGOING CONSIDERABLE EXPANSION IN MINING AND POWER GENERATION ACTIVITY. THE PROJECT WILL ENTAIL:

1. REFINING EXISTING MATHEMATICAL TECHNIQUES FOR MEASURING DISPERSION VARIABILITY;
2. GATHERING EXISTING METEOROLOGICAL DATA;
3. ANALYZING THE DATA TO YEILD A DISPERSION PATTERN; AND
4. EVALUATING THE EFFICACY OF CONTROL DEVICES IN VIEW OF LOCAL DISPERSION CHARACTERISTICS.

00000153

PROJECT TITLE:
AN ASSESSMENT OF THE EFFECTS OF ENERGY DEVELOPMENT IN THE FORT UNION BASIN, MONTANA AND NEIGHBORING STATES

PROJECT NUMBER:
75-14178

PROJECT SUPERVISOR:
ARNOLD J. SILVERMAN
UNIV. OF MONTANA
DEPT. OF GEOLOGY
MISSOULA, MT 59801
406-243-0211

PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION
RALPH M. PERHAC
1800 G ST. NW
WASHINGTON, DC 20550

PRIMARY FUNDING AMOUNT:
175,000

TIME FRAME:
05 01 75 TO 04 30 76

LOCATION:
MT

ABSTRACT:

OVER THE NEXT 5 TO 10 YEARS, A MARKED INCREASE IN COAL MINING AND POWER GENERATION WILL OCCUR IN EASTERN MONTANA. MONTANA IS WELL SUITED FOR STUDYING THE ENVIRONMENTAL EFFECTS OF THIS INCREASED INDUSTRIALIZATION BECAUSE THE AREA IS STILL IN A NEARLY PRISTINE STATE, HENCE ENVIRONMENTAL ASSESSMENT CAN BE MEANINGFUL. A MEASUREMENT OF THE IMPACT ON THE ENVIRONMENT, HOWEVER, CAN BE ACHIEVED ONLY IF PRE-INDUSTRIAL (BASELINE) DATA ARE AVAILABLE.

THE GOAL OF THIS RESEARCH IS TO UNDERTAKE A PROGRAM OF GATHERING BIOPHYSICAL BASELINE DATA WHICH ARE NEEDED FOR THE ENVIRONMENTAL ASSESSMENT. THESE BASELINE STUDIES WILL FOCUS ON HYDROLOGY, WATER RESOURCES, LAND USE AS RELATED TO PRESENT ECOSYSTEMS, AND REMOTE SENSING AS A MEANS OF MONITORING LAND CHANGES. MOST OF THIS WORK WILL BE ACCOMPLISHED BY GOING INTO THE FIELD TO GATHER DATA.

IN ADDITION TO THE BIOPHYSICAL PROGRAM, ONE STUDY WILL INVOLVE ECONOMIC PROJECTIONS OF COAL MINING AND POWER GENERATION ACTIVITIES IN EASTERN MONTANA. THESE PROJECTIONS WILL PROFICE THE FRAMEWORK FOR FUTURE ENVRIONMENTAL ASSESSMENT STUDIES, ESPECIALLY THOSE DEALING WITH SOCIOLOGICAL IMPACT.

00000154

PROJECT TITLE:
METHODOLOGY TO ENHANCE THE ENVIRONMENTAL IMPACT INVESTIGATION PROCESS

PROJECT NUMBER:
75-12939

INVESTIGATORS:
BRUCE B. HANSHAW; EDGAR A. IMHOFF

PROJECT SUPERVISOR:
BRUCE B. HANSHAW
U.S. GEOLOGICAL SURVEY
NATIONAL CENTER - 125
RESTON, VA. 22092
202-860-6892

PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION
RALPH M. PERHAC
1800 G ST. NW
WASHINGTON, DC 20550
202-860-6892

PRIMARY FUNDING AMOUNT:
75,000

TIME FRAME:
03 01 75 TO 10 31 75

LOCATION:
GX MT

ABSTRACT:
THIS WORK IS DESIGNED TO DEVELOP A SYSTEMIZED AND COMPUTERIZED METHOD OF IMPROVING THE ASSESSMENT OF OF ENVIRONMENTAL IMPACTS.

WORKING WITH A CONSULTING FIRM (THE MITRE CORP.) AND A CONSULTING PANEL, THE RESEARCH GROUP LISTS ALL IDENTIFIABLE WORK ACTIVITIES RELATING TO A PROJECT, THOSE PARTS OF THE ENVIRONMENT WHICH WILL BE AFFECTED, AND THE PARTICULAR ENVIRONMENTAL EFFECTS. FROM THIS, AN EXPANDING NETWORK OF SECONDARY AND TERITARY EFFECTS WILL BE DEDUCED. BY ASSIGNING A WEIGHTING FACTOR TO EACH EFFECT, A SUM-TOTAL ENVIRONMENTAL IMPACT CAN BE GENERATED. THE SYSTEM WILL BE DESIGNED FOR COMPUTER USE.

THE STUDY WILL FOCUS ON THE EASTERN MONTANA COAL DEVELOPMENT. THE PROPOSED METHOD DIFFERS FROM OTHERS IN ITS FLEXIBILITY (ABILITY TO BE ADAPTED TO OTHER PROJECTS), ITS EASE OF ACCOMMODATING NEW DATA, AND ITS EMPHASIS ON EVALUATING THOSE SECONDARY AND TERTIARY EFFECTS WHICH ARISE FROM THE PRIME ENVIRONMENTAL DAMAGE.

00000155

PROJECT TITLE:
ENVIRONMENTAL IMPACT STATEMENT, YOUNGS CREEK MINE, CROW RESERVATION, MONTANA

PROJECT NUMBER:
CR 00-107

INVESTIGATORS:
CHARLES W. LANE

PROJECT SUPERVISOR:
ALFRED CLEBSCH
REGIONAL HYDROLOGIST
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
BLDG. 25, DENVER FEDERAL CENTER
LAKEWOOD, CO 80225
303-234-3661

PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION

PRIMARY FUNDING AMOUNT:
80,000

TIME FRAME:
01 01 75 TO 10 01 75

LOCATION:
MT

ABSTRACT:
A HIGH NATIONAL PRIORITY HAS BEEN ASSIGNED TO THE DEVELOPMENT OF EXTENSIVE LOW-SULFUR COAL DEPOSITS OF THE NORTHERN GREAT PLAINS TO MEET URGENT ENERGY REQUIREMENTS. THE CROW INDIAN RESERVATION, MONTANA HAS EXTENSIVE COAL DEPOSTIS THAT HAVE BEEN LEASED FOR DEVELOPMENT. STRIP MINING IS THE PROPOSED MINING METHOD AND THE POTENTIAL WILL EXIST FOR SERIOUS ENVIRONMENTAL IMPACT ON THE LAND, WATER, AIR, BIOLOGIC, AND HUMAN RESOURCES OF THE CROW RESERVATION AND ADJACENT AREAS. AS THE U.S. GEOLOGICAL SURVEY HAS SUPERVISORY RESPONSIBILITY FOR MINERAL RESOURCE DEVELOPMENT ON INDIAN LANDS, AN ENVIRONMENTAL IMPACT STATEMENT IS REQUIRED IN COMPLIANCE WITH THE NATIONAL ENVIRONMENTAL POLICY ACT OF 1969.

OBJECTIVE:
AN ANALYSIS OF THE ENVIRONMENTAL IMPACT OF THE PROPOSED COAL DEVELOPMENT AND RECLAMATION AND PREPARATION OF A DRAFT AND FINAL ENVIRONMENTAL IMPACT STATEMENT.

APPROACH:
THE GEOLOGICAL SURVEY HAS BEEN DESIGNATED AS LEAD AGENCY FOR PREPARATION OF THE ENVIRONMENTAL IMPACT STATEMENT FOR THE PROPOSED COAL DEVELOPMENT. A TASK FORCE WILL BE ASSEMBLED PREPESENTING THE REQUIRED DISCIPLINES FOR THE IMPACT ANALYSIS.

THE TASK FORCE WILL INCLUDE REPRESENTATIVES OF THE WATER RESOURCES, GEOLOGIC, AND CONSERVATION DIVISIONS OF USGS, THE BUREAU OF INDIAN AFFAIRS, INTERSTATE COMMERCE COMMISSION, INTERIOR SOLICITOR'S OFFICE, AND POSSIBLY, THE BUREAU OF RECLAMATION AND CROW TRIBAL COUNCIL.

CONTACT WILL BE MADE WITH OTHER FEDERAL AND STATE AGENCIES HAVING A POSSIBLE INTEREST IN THE DEVELOPMENT. AVAILABLE DATA FROM THE AGENCIES COMPRISING THE TASK FORCE AND CONTAINED IN THE LEASEE'S PLAN AND RECLAMATION WILL BE USED IN THE ANALYSIS.

ASSIGNMENTS WILL BE MADE TO TASK FORCE MEMBERS FOR PREPARATION OF APPROPRIATE PARTS OF THE IMPACT STATEMENT WITH FINAL ASSEMBLY, EDITING, REVIEW, AND PUBLICATION THE RESPONSIBILITY OF THE PROJECT LEADER.

0C000156
PROJECT TITLE:
ENVIRONMENTAL CONTROL TECHNOLOGY
PROJECT NUMBER:
SH482
INVESTIGATORS:
R. F. CARTER; D. O. JOHNSON
PROJECT SUPERVISOR:
R. F. CARTER
ARGONNE NATIONAL LABORATORY, EES DIVISION
BUILDING 12
ARGONNE, ILLINOIS
312-739-7711 x5135
PRIMARY SPONSOR:
U.S. ERDA, DIV. OF BIOMEDICAL & ENV. RESEARCH
WILLIAM MOTT
WASHINGTON, D. C. 20545
301-973-3718
PRIMARY FUNDING AMOUNT:
75,000
REPRESENTS A PORTION OF TOTAL CONTRACT FOR 300K THAT WILL FOCUS ON HGP.
TIME FRAME:
07 01 75 TO 07 01 76
LOCATION:
ND SD MT - ASSESSMENT IN WILLISTON BASIN
ABSTRACT:
A REPORT ON THE ALTERNATIVE TECHNOLOGIES SHOWING PROMISE FOR THE CONTROL OF EFFLUENTS AND WASTES FROM STRIP MINING OPERATIONS IN THE WILLISTON BASIN THROUGH THE NEXT 20 YEARS. THIS REPORT WILL BE DIVIDED INTO TWO PHASES: PHASE I: SURVEY EXISTING AND LIKELY FUTURE SITES FOR STRIP MINING ACTIVITY, AND PROJECT SUCH ACTIVITIES, THE TECHNOLOGY INVOLVED, THE VOLUMES AND CHARACTERISTICS OF THE WASTES AND EFFLUENTS, AND THE POTENTIAL ENVIRONMENTAL IMPACTS OF THESE VOLUMES (BASED ON BER OR OTHER ASSESSMENT OF IMPACTS OF SUCH MATERIALS). PHASE II: ALTERNATIVE TECHNOLOGIES FOR TYPE SITES WILL BE DELINEATED, BASED ON STATISTICAL CORRELATION BETWEEN SITES, ENVIRONMENTAL CONTROL PRACTICES, AND THE EFFECTIVENESS OF THOSE PRACTICES.

00000157
PROJECT TITLE:
HABITAT REQUIREMENTS AND LOCATIONS OF SPAWNING AND NURSERY AREAS IN THE EAST POPULAR RIVER, MONTANA
PROJECT NUMBER:
OEA-75-7C
INVESTIGATORS:
JERRY KEISER
MONTANA WATER QUALITY BUREAU
BILLINGS, MT
406-252-5697
PROJECT SUPERVISOR:
MAX BOTZ
MONTANA WATER QUALITY BUREAU
HELENA, MT
406-449-2406
PRIMARY SPONSOR:
U. S. ENVIRONMENTAL PROTECTION AGENCY
MARSHALL PAYNE
1860 LINCOLN ST.
DENVER, COLORADO 80203
303-837-4261
PRIMARY FUNDING AMOUNT:
8,279
TIME FRAME:
07 01 75 TO 06 30 76
LOCATION:
MT
ABSTRACT:
COAL MINING, DEVELOPMENT OF POWER GENERATING PLANT AND DAM CONSTRUCTION ON, OR ADJACENT TO, THE POPLAR RIVER IN CANADA COULD EFFECT LOWER SEGMENTS OF THE POPLAR RIVER IN MONTANA. IN CONJUNCTION WITH WATER QUALITY STUDIES AN INTENSIVE INVESTIGATION OF THE BIOTIC RESOURCES OF THE EAST POPLAR RIVER CONDUCTED. FISHERY STUDIES ARE TO BE INITIATED TO DETERMINE RELATIVE ABUNDANCE, DISTRIBUTION, NURSERY AND SPAWNING AREAS, HABITAT REQUIREMENTS AND SPECIES COMPOSITION. THE SURVEILLANCE AND ANALYSIS DIVISION, U. S. ENVIRONMENTAL PROTECTION AGENCY WILL CONTRIBUTE 12 MAN-WEEKS OF ASSISTANCE TO THE MONTANA WATER QUALITY BUREAU IN CONDUCTING THE SUBJECT STUDY.

00000158
PROJECT TITLE:
WATER QUALITY AND BIOLOGICAL MONITORING PROGRAM FOR ENERGY RESOURCE AREAS - MONTANA
PROJECT NUMBER:
OEA-75-(2A(1)-2A(2))
INVESTIGATORS:
U. S. GEOLOGICAL SURVEY
HELENA, MONTANA
PRIMARY SPONSOR:
U. S. ENVIRONMENTAL PROTECTION AGENCY
LES SPRENGER
1860 LINCOLN ST.
DENVER, COLORADO 80203
303-837-4261
PRIMARY FUNDING AMOUNT:
27,990
TIME FRAME:
04 01 75 TO 04 01 76
LOCATION:
MT
ABSTRACT:
COLLECTION OF BASELINE WATER QUALITY AND BIOLOGICAL MONITORING DATA FOR ENERGY RESOURCE AREAS IN THE YELLOWSTONE AND TONGUE RIVER BASINS. 8 STATIONS. SECOND YEAR OF DATA COLLECTION.
REPORTS AND PUBLICATIONS:
DATA WILL BE AVAILABLE FROM THE EPA STORET DATA STORAGE AND RETRIEVAL.

00000159
PROJECT TITLE:
NUMERICAL SIMULATION OF CLOUD AND PRECIPITATION PROCESSES
INVESTIGATORS:
C. S. CHEN
RICHARD D. FARLEY
PROJECT SUPERVISOR:
H. D. ORVILLE
SOUTH DAKOTA SCHOOL OF MINES & TECH., INST. OF ATMOS. SCI.
RAPID CITY, SD 57701
605-394-2291
PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION
H. FRANK EDEN
1800 G ST. N.W.
WASHINGTON, DC 20550
202-632-4190
PRIMARY FUNDING AMOUNT:
100,800
TIME FRAME:
03 01 75 TO 08 31 76
LOCATION:
SD
ABSTRACT:
WE PROPOSE TO CONTINUE OUR STUDY OF CLOUD AND PRECIPITATION PROCESSES USING NUMERICAL MODELS OF SUCH PROCESSES IN AN INTERACTING MICROPHYSICS-DYNAMICS FRAMEWORK. OUR MODELS EMPHASIZE HAIL AND RAIN PROCESSES IN CONVECTIVE TYPE CLOUDS. WE PLAN TO DEVELOP FURTHER OUR SIMULATION OF ATMOSPHERIC ELECTRICITY EFFECTS, MODIFY-

ING A SLAB SYMMETRIC 'BULK WATER' CLOUD MODEL TO AN AXISYMMETRIC ONE. EQUATIONS FOR A DETAILED MICROPHYSICAL TREATMENT OF THE RAIN AND HAIL PROCESSES WILL BE DEVELOPED IN A ONE-DIMENSIONAL, TIME-DEPENDENT MODEL. THE ICE EQUATIONS, WHICH NOW INCLUDE 20 CATEGORIES FOR ICE PELLETS AND HAIL, WILL BE EXTENDED IN THE LOWER RANGE TO INCLUDE GRAUPEL, SO THAT BOTH FREEZING OF RAINDROPS AND RIMING ON ICE CRYSTALS CAN PRODUCE HAIL EMBRYOS. OUR TWO-DIMENSIONAL, TIME-DEPENDENT CLOUD MODELS WILL HAVE THE IMPROVED ICE PROCESSES INCORPORATED IN THEM AND TESTED AGAINST REAL DATA. INTERACTIONS OF THE CLOUD SCALE WITH THE MESOSCALE WILL BE STUDIED. SIMULATED CLOUD SEEDING EXPERIMENTS WILL BE RUN TO QUANTIFY THE EFFECTS OF ICE-PHASE AND HYGROSCOPIC SEEDING OF CONVECTIVE CLOUDS.

A NUMERICAL SIMULATION WAS MADE OF THE EFFECTS OF AIR POLLUTION ON CLOUD AND PRECIPITATION PROCESSES IN WARM CLOUDS. NATURAL AND POLLUTED PARTICULATE DISTRIBUTIONS WERE DEVELOPED BASED UPON OBSERVATIONS IN THE NORTHERN GREAT PLAINS AREA AND OF THE COAL-FIRED POWER PLANT EFFLUENT. CLOUD DROPLET GROWTH ON THESE DISTRIBUTIONS WAS MODELED IN A CONDENSATION MODEL. THIS WORK WAS THE PRIMARY FOCUS OF THE PRESENT STUDY. PARAMETERS DESCRIBING THE RESULTING DROPLET DISTRIBUTIONS WERE USED AS INPUT TO TWO ONE-DIMENSIONAL, TIME-DEPENDENT CLOUD MODELS -- ONE HIGHLY-PARAMETERIZED AND ONE WITH DETAILED MICROPHYSICS. A CASE STUDY WAS MADE IN WHICH WARM CLOUD PROCESSES WERE ACTIVE. NO ATTEMPT WAS MADE TO MODEL EFFECTS ON ICE PROCESSES.

REPORTS AND PUBLICATIONS:

1. CHEN, C. S., AND G. L. DAVIS, 1974. 'A POSSIBLE DECREASE IN RAINFALL FROM COAL-FIRED POWER PLANT EFFLUENT AS SUGGESTED BY A NUMERICAL MODELING EXPERIMENT.' PREPRINTS, SYMPOSIUM ON ATMOSPHERIC DIFFUSION AND AIR POLLUTION, SANTA BARBARA, CALIFORNIA, SEPTEMBER [illegible]-13, 1974, 151-154.

2. HJELMFELT, M. R., 1975. 'NUMERICAL SIMULATION OF AIR POLLUTION EFFECTS ON CLOUD AND PRECIPITATION PROCESSES IN CLOUDS.' M.S. THESIS, SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY, RAPID CITY, SOUTH DAKOTA.

00000160

PROJECT TITLE:

ENVIRONMENTAL ASSESSMENT OF THE BLACK THUNDER MINE SITE, CAMPBELL COUNTY, WYOMING.

INVESTIGATORS:

HAROLD L. BERGMAN (EDITOR)

PROJECT SUPERVISOR:

OSCAR H. PARIS
UNIV. OF WYOMING, DEPT. OF ZOOLOGY & PHYSIOLOGY
BOX 3166, UNIVERSITY STATION
LARAMIE, WY 82071
307-766-4207

COOPERATOR/COORDINATOR:

WYOMING ENVIRONMENTAL INSTITUTE
LESLIE PETERSEN
P. O. BOX 2497
JACKSON, WY 83001
307-733-3056

PRIMARY SPONSOR:

ATLANTIC RICHFIELD COMPANY
JAMES TATE, JR.
1000 SECURITY LIFE BUILDING
1616 GLENARM
DENVER, CO 80202
303-573-3530

PRIMARY FUNDING AMOUNT:

250,000

TIME FRAME:

06 01 73 TO 01 01 76

LOCATION:

WY

ABSTRACT:

ENVIRONMENTAL ASSESSMENT OF THE BLACK THUNDER MINE SITE, CAMPBELL COUNTY, WYOMING.

SENIOR AUTHORS OF COMPONENT REPORTS, ALL AT THE UNIV. OF WYOMING ARE:

ARCHAEOLOGY - GEORGE C. FRISON, DEPT. OF ANTHROPOLOGY.
CLIMATOLOGY - JOHN D. MARWITZ, DEPT. OF ATMOSPHERIC SCIENCE.
ECONOMICS - ORMAN PAANANEN, DEPT. OF ECONOMICS.
GEOCHEMISTRY - JAMES I. DREVER, DEPT. OF GEOLOGY.
HYDROLOGY - VICTOR HASFURTHER, DEPT. OF CIVIL ENGINEERING.
INVERTEBRATE FAUNA - OSCAR PARIS, DEPT. OF ZOOLOGY & PHYSIOLOGY.
LIMNOLOGY - MICHAEL PARKER, DEPT. OF ZOOLOGY & PHYSIOLOGY.
SOCIOLOGY - AUDIE L. BLEVINS, DEPT. OF SOCIOLOGY.
SOILS - PAUL C. SINGLETON, DIV. OF PLANT SCIENCE.
SOIL MICROFLORA AND MICROFAUNA - NANCY L. STANTON, DEPT. OF ZOOLOGY & PHYSIOLOGY.
TERRESTRIAL VERTEBRATES - REED W. FAUTIN, DEPT. OF ZOOLOGY & PHYSIOLOGY.
VEGETATION - RONALD RIES, C/O HERBERT FISSER, DIV. OF PLANT SCIENCE.

00000161

PROJECT TITLE:

SYNTHETIC FUEL PROCESS EMISSIONS

PROJECT NUMBER:

OEA-75-32A

PROJECT SUPERVISOR:

SCOTT LA GRONE
RADIAN CORPORATION
8500 SHOAL CREEK BLVD.
AUSTIN, TX 78766

512-454-4787
PRIMARY SPONSOR:
U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION VIII
TERRY THOEM
OFFICE OF ENERGY ACTIVITIES
1860 LINCOLN
DENVER, CO
303-837-3073
PRIMARY FUNDING AMOUNT:
14,810
TIME FRAME:
07 31 75 TO 01 31 76
LOCATION:
CO
ABSTRACT:
DETAILED AIR EMISSIONS DATA AND PLANT PROCESS DATA ARE NEEDED FOR ACCURATE AIR QUALITY MAINTENANCE PLANNING. GATHERING OF THESE DATA FOR POTENTIAL COAL GASIFICATION AND OIL SHALE CONVERSION PLANTS WILL ALLOW THE CONCERNED STATE AGENCIES TO MORE ACCURATELY DEFINE AIR QUALITY MAINTENANCE PLAN REQUIREMENTS.
AIR POLLUTANT EMISSIONS ESTIMATES WILL BE MADE FOR PARTICULATE, SULFUR DIOXIDE, HYDROCARBONS, NITROGEN OXIDES, CARBON MONOXIDE AND CERTAIN TRACE ELEMENTS FROM COAL GASIFICATION AND OIL SHALE CONVERSION FACILITIES.

00000162
PROJECT TITLE:
STUDY AND MONITORING OF FORT UNION BASIN - AIR QUALITY
PROJECT SUPERVISOR:
DAVID MAUGHAN
MONTANA DEPT. OF HEALTH & ENVIRONMENTAL SCI.
COGSWELL BUILDING
HELENA, MT 59601
PRIMARY SPONSOR:
ENVIRONMENTAL PROTECTION AGENCY - REGION VIII
C/O MARSHALL PAYNE
1860 LINCOLN
DENVER, CO 80203
303-837-3073
PRIMARY FUNDING AMOUNT:
30,628
TIME FRAME:
07 01 75 TO 06 30 76
LOCATION:
MT
ABSTRACT:
MEASUREMENT OF AIR QUALITY (PARTICULATE, SO2 AND NOX) LEVELS AT 11 SITES IN EASTERN MONTANA.
REPORTS AND PUBLICATIONS:
QUARTERLY DATA REPORTS TO EPA

00000163
PROJECT TITLE:
PILOT BALLOON OBSERVATIONS IN THE NORTHERN GREAT PLAINS
TEMPERATURE SOUNDINGS IN THE NORTHERN GREAT PLAINS
INVESTIGATORS:
AEROMET
P. O. BOX FF
NORMAN, OK
PROJECT SUPERVISOR:
WESTERN SCIENTIFIC SERVICES
326 AIRPACK DR.
FT. COLLINS, CO 80523
PRIMARY SPONSOR:
ENVIRONMENTAL PROTECTION AGENCY - REGION VIII
DAVID JOSEPH
1860 LINCOLN
DENVER, CO 80203
303-837-3073
PRIMARY FUNDING AMOUNT:
32,000
TIME FRAME:
06 01 75 TO 07 01 76
LOCATION:
MT
ABSTRACT:
UPPER AIR (TO 6,000 FT.) TEMPERATURE AND WIND DATA ARE OBTAINED AT COLSTRIP FOR DATA INPUT TO AIR QUALITY DIFFUSION MODELING. TWICE A DAY EVERY OTHER DAY PILOT BALLOON RELEASES ARE MADE. A VERTICAL TEMPERATURE PROFILE AND WIND SPEED AND DIRECTION ARE OBTAINED. ATMOSPHERIC STABILITY CATEGORIES ARE DEFINED.

00000164
PROJECT TITLE:
STUDY AND MONITORING OF FORT UNION BASIN - AIR QUALITY
PROJECT SUPERVISOR:
DAVID MAUGHAN
MONTANA DEPT. OF HEALTH & ENVIRONMENTAL SCI.
COGSWELL BUILDING
HELENA, MT 59601
406-449-3454
PRIMARY SPONSOR:
ENVIRONMENTAL PROTECTION AGENCY - REGION VIII
C/O MARSHALL PAYNE
1860 LINCOLN ST.
DENVER, CO 80203
303-837-4261
PRIMARY FUNDING AMOUNT:
72,176
TIME FRAME:
01 15 75 TO 06 30 76

LOCATION:
MT
ABSTRACT:
BACKGROUND LEVELS OF AIR QUALITY ARE MONITORED AT TWO LOCATIONS IN THE COLSTRIP AREA. METEOROLOGICAL DATA IS ALSO OBTAINED. SO2, NOX, HC, TSP, O3, TRACE ELEMENTS AND FINE PARTICLE MEASUREMENTS ARE BEING MADE. DATA IS COLLECTED, REDUCED, VALIDATED, AND PLACED INTO A NATIONAL DATA BANK BY THE MONTANA DEPT. OF ENVIRONMENTAL SCIENCES.
REPORTS AND PUBLICATIONS:
QUARTERLY DATA SUBMISSIONS TO THE ENVIRONMENTAL PROTECTION AGENCY - REGION VIII ARE AVAILABLE UPON REQUEST.

00000165
PROJECT TITLE:
EFFECTS OF SO2 AND OTHER COAL-FIRING PLANT EMISSIONS ON PRODUCER, INVERTEBRATE CONSUMER, AND DECOMPOSER STRUCTURE AND FUNCTION IN AN EASTERN MONTANA GRASSLAND
INVESTIGATORS:
WILLIAM K. LAUENROTH; ROBERT WOODMANSEE
PROJECT SUPERVISOR:
J. L. DODD
NATURAL RESOURCE ECOLOGY LABORATORY
COLORADO STATE UNIV.
FT. COLLINS, CO 80523
303-491-5571
PRIMARY SPONSOR:
U.S. ENVIRONMENTAL PROTECTION AGENCY
1860 LINCOLN ST.
DENVER, CO 80203
PRIMARY FUNDING AMOUNT:
204,413
TIME FRAME:
06 10 74 TO 06 09 76
LOCATION:
MT
ABSTRACT:
THE OVERALL OBJECTIVE OF OUR TASK IS TO DETERMINE THE EFFECTS OF COAL-FIRED POWER PLANT EMISSIONS ON THE STRUCTURE AND FUNCTION OF A SOUTHEASTERN MONTANA GRASSLAND ECOSYSTEM AND TO REPRESENT THESE EFFECTS IN A TOTAL SYSTEM SIMULATION MODEL.
ONE SET OF OBJECTIVES RELATES TO MONITORING OF FOUR GRASSLAND STUDY SITES (HAY COULEE, KLUVER WEST, KLUVER NORTH, AND KLUVER EAST) NEAR THE COAL-FIRED POWER PLANT AT COLSTRIP, MONTANA. THESE SITES ARE EXPECTED TO BE EXPOSED TO DIFFERING INTENSITIES OF ATMOSPHERIC POLLUTION FOLLOWING COMPLETION OF THE PLANT DURING 1975.
A SECOND ARRAY OF OBJECTIVES RELATES TO THE FIELD EXPERIMENTAL STUDY TO BE LOCATED TEN MILES EAST OF THE FT. HOWES RANGER STATION IN THE CUSTER NATIONAL FOREST. OUR OBJECTIVES ARE TO DETERMINE THE EFFECTS OF THREE LEVELS OF SO2 (2, 5, 10 PPHM MONTHLY MEDIAN), A MAJOR COMPONENT OF POWER PLANT EMISSIONS ON THE SEASONAL BIOMASS DYNAMICS OF THE PRIMARY PRODUCERS AND ON DECOMPOSITION RATES.
A FINAL SET OF OBJECTIVES PERTAIN TO THE ADAPTATION OF THE NATURAL RESOURCE ECOLOGY LABORATORY ECOSYSTEM LEVEL SIMULATION MODEL TO THE GRASSLAND TYPE MENTIONED IN THE PREVIOUS OBJECTIVES.
REPORTS AND PUBLICATIONS:
W. K. LAUENROTH, J. L. DODD, ET AL. 1975. BIOMASS DYNAMICS AND PRIMARY PRODUCTION IN MIXED PRAIRIE GRASSLANDS IN SOUTHEASTERN MONTANA: BASELINE DATA FOR AIR POLLUTION STUDIES.

00000166
PROJECT TITLE:
INTEGRATED AEROSOL CHARACTERIZATION MONITORING - COLSTRIP MONTANA
INVESTIGATORS:
R. F. PUESCHEL G. T. MENICE
PROJECT SUPERVISOR:
V. E. DERR
U.S. NATIONAL OCEANIC & ATMOSPHERIC ADMIN.
3100 MARINE AVE.
BOULDER, CO 80302
PRIMARY SPONSOR:
U.S. EPA, CORVALLIS NAT. ENV. RESEARCH CENTER
CORVALLIS, OR 97330
PRIMARY FUNDING AMOUNT:
252,000
TIME FRAME:
05 01 75 TO 12 31 76
LOCATION:MT
INSITU AEROSOL MEASUREMENTS ARE DONE BY THE LIDAR SYSTEM THROUGHOUT A LARGE HEMISPHERICAL VOLUME. TWICE DURING EACH ONE MONTH PERIOD THE LIDAR CALIBRATION IS TRANSFERRED TO THE EPA AIRBORNE LIDAR SYSTEM, ENABLING IT TO RECORD AEROSOL DENSITY PROFILES OVER MANY MILES.
THE RESULTS OF THE AEROSOL MEASUREMENTS ARE COMPARED WITH CHANGES IN ATMOSPHERIC TURBIDITY, INCOMING SOLAR RADIATION AND HEAT RADIATION BALANCE. INCOMING SOLAR RADIATION IS CONTINUOUSLY MONITORED WITH AN OPTICAL PYRANOMETER AND PYRHELIOMETER, TURBIDITY IS MEASURED THREE TIMES DAILY, AND THE HEAT RADIATION BALANCE IS DETERMINED FROM INFRARED RADIOMETERS LOOKING UP FROM THE GROUND AND DOWN FROM AIRCRAFT AT A NUMBER OF ALTITUDES. AN ACOUSTIC SOUNDER IS OPERATED CONTINUOUSLY TO MONITOR THE TEMPERATURE INVERSIONS SO IMPORTANT IN POLLUTANT TRAPPING. STANDARD METEOROLOGICAL VARIABLES ARE ALSO MEASURED.
AEROSOL CHARACTERIZATION INFORMATION WILL BE SYNTHESIZED WITH THE EFFECTS AND GASEOUS CHARACTERIZATION COMPONENTS

OF EPA NERL'S COLSTRIP PROGRAM TO YIELD A PROTOCOL WHICH PLANNING MANAGERS CAN USE IN ASSESSING THE EFFECTS OF COAL-FIRED POWER PLANTS ON THE ENVIRONMENT.

00000167

PROJECT TITLE:
ATMOSPHERIC SCIENCES: POTENTIAL OF ENERGY EXTRACTION AND CONVERSION PROCESSES IN THE NORTHERN GREAT PLAINS FOR SULFUR, FLUORINE, HEAVY METALS CONTAMINATION IN TERRESTRIAL AND AQUATIC ECOSYSTEMS AND ITS IMPACT ON PLANT COMMUNITY PRODUCTIVITY AND STABILITY INCLUDING SECONDARY EFFECTS ON ANIMAL SPECIES IN THE FOOD CHAIN.

INVESTIGATORS:
CLARENCE C. GORDON
UNIV. OF MONTANA
MISSOULA, MT 59801
406-243-2671

PROJECT SUPERVISOR:
JAMES J. O'TOOLE, PH.D.
U.S. ERDA, AMES LAB.
AMES, IOWA 50010
515-294-2500

COOPERATOR/COORDINATOR:
MONTANA STATE UNIV.
BATTELLE NORTHWEST LABORATORIES

PRIMARY SPONSOR:
U.S. ENERGY RESEARCH AND DEVELOPMENT ADMIN.
AMES LAB.
AMES, IA 50010

PRIMARY FUNDING AMOUNT:
370,000

TIME FRAME:
06 01 75 TO CONTINUING

LOCATION:
MT

ABSTRACT:

THIS PROPOSED STUDY INCLUDES PROGRAMS BY THE UNIVERSITY OF MONTANA, MONTANA STATE UNIVERSITY, BATTELLE NORTHWEST AND THE AMES LABORATORY OF IOWA STATE UNIVERSITY. IT IS PLANNED THAT THE PROGRAM WILL BE MANAGED BY THE AMES LABORATORY. JAMES J. O'TOOLE OF THE AMES LABORATORY AND CLARENCE G. GORDON OF THE UNIVERSITY OF MONTANA ARE PRINCIPAL INVESTIGATORS WITH RICHARD W. PERKINS OF BATTELLE NORTHWEST LABORATORIES AS INVESTIGATOR AND CONSULTANT. THE GENERAL RESEARCH PLAN INCLUDES THE FOLLOWING DIVISION OF EFFORT.

1. A MASS BALANCE STUDY OF THE COLSTRIP GENERATING STATION WHICH WILL INCLUDE A QUALITATIVE DESCRIPTION AND QUANTITATIVE MEASUREMENT OF THE FLOWTHROUGH OF MAJOR AND MINOR ELEMENTS WITH AN EVALUATION OF THEIR RELEASE RATE AND DISPERSION. THIS STUDY WILL BE CARRIED OUT BY THE BATTELLE NORTHWEST TEAM UNDER R. W. PERKINS.

2. A SAMPLING PROGRAM DESIGNED TO EVALUATE THE WET AND DRY DEPOSITION RATES OF AIR POLLUTANTS EMANATING FROM THE COLSTRIP STACKS AS THEY ARE RELATED TO DISTANCE, DIRECTION AND TERRAIN FEATURES. THIS SAMPLING PROGRAM AND THE ASSOCIATED FIELD WORK WILL BE CARRIED OUT BY PERSONNEL FROM THE FOUR LABORATORIES INVOLVED IN THESE STUDIES OPERATING FROM THE COMMUNICATION CENTER IN THE MONTANA ENVIRONMENTAL STUDIES LABORATORY IN MISSOULA AND A PERMANENT FIELD STATION IN COLSTRIP WHICH WILL FACILITATE COMMUNICATIONS AND ASSISTANCE IN FIELD WORK.

3. AN ASSESSMENT OF THE UPTAKE BY TERRESTRIAL PLANT SPECIES OF POLLUTANTS RESULTING FROM FUEL CONVERSION INCLUDING MEASUREMENT OF DEPOSITION RATE, RETENTION AND BIOCONCENTRATION. THESE STUDIES WILL INCLUDE AN EVALUATION OF: 1. THE PRESENCE OF PATHOLOGIC LESIONS AND PHYSIOLOGIC CHANGES IN KEY PLANT SPECIES, AND 2. CHANGES IN VIGOR, DENSITY, BIOMASS PRODUCTIVITY, AND CANOPY COVER OF KEY PLANT COMMUNITIES, 3. CHANGES IN CERTAIN POLLUTANT ELEMENTS IN SOILS AT THESE SITES. THIS ASSESSMENT WILL BE THE RESPONSIBILITY OF C. C. GORDON AND F. MUNSHOWER; ANALYTICAL DATA ON TRACE ELEMENTS WILL BE SUPPLIED BY THE AMES LABORATORY.

4. THROUGH A JUDICIOUS SAMPLING AND ANALYTICAL PROGRAM, THE APPEARANCE OF POLLUTANT ELEMENTS IN THE PRINCIPAL ANIMAL SPECIES OF THESE SITES WILL BE OBSERVED. THE DEGREE OF BIOCONCENTRATION AND PHYSIOLOGICAL EFFECTS OF THE PROCESS WILL BE NOTED. EVALUATION OF THESE IMPACTS WILL BE UNDERTAKEN BY GORDON, MUNSHOWER AND O'TOOLE WITH THE ASSISTANCE OF THE MONTANA FISH & GAME DEPARTMENT. THIS PROGRAM RELATES CLOSELY TO THE ONGOING EPA STUDY IN WHICH C. C. GORDON IS PARTICIPATING.

5. THE EFFICIENCY AND RATE AT WHICH FALLOUT OF ELEMENTAL POLLUTANTS ORIGINATING FROM COLSTRIP STACKS ARE TRANSPORTED DOWN A MODEL WATERSHED TO ITS IMPOUNDMENT WILL BE MEASURED. FOLLOWING PERIODS OF POWER PLANT OPERATION, RESULTANT CHANGES IN WATER COMPOSITION, BIOMASS PRODUCTIVITY, ALGAL SUCCESSION AND THE BIOCONCENTRATION OF THESE TRACE ELEMENTS IN ALGAE, MACROPHYTES, AND THE FOOD WEB WILL BE EVALUATED.

6. LABORATORY STUDIES DESIGNED TO MEASURE THE RATE OF UPTAKE OF KEY POLLUTANT ELEMENTS BY ALGAE AND PLANT SPECIES RESIDENT TO THE IMPOUNDMENT SITE WILL BE CARRIED OUT. BIOCONCENTRATIONS THESE SPECIES EXHIBIT FOR THE CONTAMINATING ELEMENTS WILL BE EVALUATED. THIS WORK WILL BE DIRECTED BY R. WILDMAN AND J. O'TOOLE AT THE AMES LABORATORY.

7. IN LABORATORY STUDIES WITH RUMINANT ANIMALS, USING APPROPRIATE RADIOACTIVE TRACERS, THE RATE OF UPTAKE, TURNOVER AND ELIMINATION OF KEY POLLUTANT ELEMENTS WHICH DEPOSIT ON VEGETATION (AS, HG, SE, ETC.) WILL BE MEASURED. THESE STUDIES WILL BE CARRIED OUT AND

DIRECTED BY J. J. O'TOOLE AT THE AMES LABORATORY.
F. THE DATA OBTAINED IN THESE INVESTIGATIONS WILL BE APPLIED TO THE PREPARATION OF A DYNAMIC MODEL WHOSE PURPOSE WILL BE TO DESCRIBE THE ACCUMULATION RATE OF POLLUTANTS, THEIR EFFECT ON VEGETATION PRODUCTIVITY AND THE BIOCONCENTRATION TRANSFER RATES OF POLLUTANT ELEMENTS TO HERBIVORES AND OMNIVORES IN THE FOOD CHAIN.

00000168
PROJECT TITLE:
COOPERATIVE EVALUATION OF POTENTIAL AIR POLLUTION INJURY AND DAMAGE TO CONIFEROUS HABITATS ON NATIONAL FOREST LANDS NEAR COLSTRIP, MONTANA.
INVESTIGATORS:
CLARENCE C. GORDEN
UNIV. OF MONTANA, ENVIRONNMENTAL STUDIES PROGRAM
MISSOULA, MT 59801
PRIMARY SPONSOR:
U.S. FOREST SERVICE, SURFACE ENVIRONMENT & MINING
GRANT DAVIS
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
33,000
TIME FRAME:
06 01 75 TO 06 30 76
LOCATION:
MT
ABSTRACT:
A SYSTEM OF 25-30 PERMANENT PLOTS ARE BEING ESTABLISHED ON THE ASHLAND DIVISION, CUSTER NATIONAL FOREST, TO DETECT AND MEASURE THE IMPACT OF COAL-FIRED POWER PLANT EMISSIONS ON FOREST AND RANGE RESOURCES. BASELINE VARIABLES BEING MEASURED INCLUDE CURRENT STATUS OF INSECTS, DISEASES, AND ABIOTIC PATHOLOGIES, TOTAL SULFUR AND FLUORIDE CONTENT OF REPRESENTATIVE VEGETATION, AND AND MEASUREMENT OF BIOMASS OF PONDEROSA PINE FOLIAGE. IN ADDITION, TOTAL CHLOROPHYLL OF PINE FOLIAGE IS BEING MEASURED. ANAYLSES OF AIR FOR FLUORIDE AND SULFUR ARE BEING DONE, AND CHEMISTRY OF PRECIPITATION IS BEING CHARACTERIZED.

00000169
PROJECT TITLE:
AN EVALUATION OF THE POTENTIAL FOR AIR POLLUTION DAMAGE TO CONIFEROUS VEGETATION IN THE CUSTER NATIONAL FOREST (ASHLAND AND FORT HOWE DIVISIONS) AND THE BLACK HILLS OF WYOMING AND SOUTH DAKOTA.
INVESTIGATORS:
C. C. GORDON
UNIV. OF MONTANA, ENVIRONMENTAL STUDIES PROGRAM
MISSOULA, MT 59801
406-243-2671
PROJECT SUPERVISOR:
CLINTON CARLSON
U.S. FOREST SERVICE, REGION I
MISSOULA, MT
406-549-6511 X3545
PRIMARY SPONSOR:
U.S. FOREST SERVICE, SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
30,000
TIME FRAME:
06 01 75 TO 05 30 76
LOCATION:
MT WY SD
ABSTRACT:
OBJECTIVES: I. TO ESTABLISH 12 PONDEROSA PINE STUDY PLOTS (THREE PLOTS BETWEEN COLSTRIP AND THE N.W. BOUNDARY OF THE CUSTER NATIONAL FOREST AND NINE PLOTS WITHIN THE CUSTER NATIONAL FOREST) WHICH ARE POTENTIALLY HIGH AIR POLLUTION IMPACT AREAS OF THE ATMOSPHERIC EMISSIONS OF THE COAL-FIRED POWER PLANTS BEING BUILT AT COLSTRIP, MONTANA.

II. TO ESTABLISH TEN OTHER PONDEROSA STUDY PLOTS ON THE CUSTER NATIONAL FOREST WHICH ARE SELECTED ON THE BASIS OF THE MAJOR PONDEROSA PINE SITE CLASSES (#3, #3, #4, #5) WHICH ARE REPRESENTATIVE OF THOSE ON THE CUSTER NATIONAL FOREST. THESE TEN SITES WILL NOT NECESSARILY BE POTENTIALLY HIGH IMPACT AREAS WHERE THE EMISSIONS OF THE COLSTRIP UTILITY PLANTS WILL OR COULD CAUSE ACUTE DAMAGE TO THE FORESTS, BUT ARE AREAS WHERE SLOW INSIDIOUS CHRONIC TYPE DAMAGE COULD OCCUR AS MORE COAL-FIRED POWER PLANTS OR OTHER FOSSIL FUEL INDUSTRIES ARE BUILT IN THE FORT UNION BASIN.

III. TO CARRY OUT A STUDY OF THE FOLLOWING PHYSICAL AND BIOLOGICAL CHARACTERISTICS OF THE 12 STUDY SITES DURING THE PERIOD OF JUNE 1, 1975 TO JUNE 1, 1976
A. THE SELECTION OF TEN PONDEROSA PINE TREES, FIVE OF WHICH WILL BE MATURE (DOMINANT OR OVER 100 YEARS OLD) AND FIVE OF WHICH WILL BE SAPLING AGE (7 TO APPROXIMATELY 30 YEARS OLD). ALL WILL BE PERMANENTLY MARKED FOR FUTURE IDENTIFICATION. EACH TREE WILL BE CHARACTERIZED BY HEIGHT, DIAMETER, APPROXIMATE AGE, POSITION ON SLOPE, ASPECT, ELEVATION, AND RELATIVE DOMINANCE. IN ADDITION, THE STAND IN WHICH THE TREE RESIDES WILL BE CHARACTERIZED BY DENSITY, STOCKING, BASAL AREA, AND AVERAGE AGE.
B. TO CARRY OUT COLLECTION OF BRANCHES AND FOLIAGE FROM EACH THE UPPER CROWN OF THE TREE AND THE LOWER HALF OF

THE CANOPY FROM THAT SIDE OF EACH TREE WHICH FACES TOWARDS COLSTRIP, MONTANA.
C. TO CARRY OUT THESE PHYSICAL MEASUREMENTS´ 1) NEEDLE RETENTION BY YEAR. 2) WET AND DRY WEIGHT OF APPROXIMATELY 100 NEEDLES FROM EACH YEAR OF GROWTH BEING RETAINED. 3) CROSS-SECTIONED AREA AND LENGTH OF APPROXIMATELY 100 NEEDLES OF EACH YEAR OF GROWTH BEING RETAINED. 4) DETERMINATION OF NEEDLE PATHOLOGY, INSECT INFESTATION, AND OVERALL HEALTH OR DISEASE OF THE FOLIAGE AND BRANCHES COLLECTED FROM THE TEN SELECTED TREES AT EACH STUDY SITE. 5)CHLOROPHYLL CONCENTRATIONS FROM UPPER AND LOWER CANOPIES; 6) TOTAL SULFUR AND FLUORIDE LEVELS PRESENT IN THE VARIOUS YEARS´ NEEDLES FROM EACH OF THE TEN TREES AT EACH STUDY SITE. 7) DETERMINATION OF THE ANNUAL INTERNODAL GROWTH OF THE BRANCHES COLLECTED FROM THE UPPER AND LOWER CANOPY OF THE TEN TREES AT EACH SITE.
D. TO COLLECT APPROXIMATELY FIVE TO TEN PLANT SPECIES WHICH INCLUDE FORBS, GRASSES AND SHRUBS GROWING BENEATH OR CLOSE TO THE PONDEROSA PINE TREES FOR CHEMICAL ANALYSIS OF SULFUR AND FLUORIDE CONTENT.
E. 1) TO SET OUT HUEY SULFATION PLATES AT EACH OF THE 12 SITES TO DETERMINE AMBIENT AIR SULFATE LEVELS OF PRE- AND POST-OPERATION OF THE COLSTRIP UNIT #1 GOING ON LINE IN JULY OR AUGUST. 2) TO SET OUT STATIC SODIUM FORMATE PLATES AT EACH SITE FOR THE DETERMINATION OF AIRBORNE HYDROGEN FLUORIDE.
F. TO SET UP EITHER WONG OR BUILD PRECIPITATION COLLECTORS AT SIX OF THE 12 STUDY SITES FOR THE DETERMINATION OF PRECIPITATION CHEMISTRY DURING THE STUDY PERIOD JUNE 1, 1975 TO JUNE 1, 1976. DETERMINATION OF THE FOLLOWING WILL BE CARRIED OUT ON RAINWATER SAMPLES   TOTAL ACIDITY, PH, SULFATE (SO4), NITRATE (NO3), AMMONIA (NH3), AND FLUORIDE (F-) CONCENTRATIONS.
G. TO COLLECT FOUR TO SIX SOIL SAMPLES (1/2´ TO 2´ DEPTH) AT EACH STUDY SITE WHICH WILL BE COLLECTED AT PRE- AND POST-OPERATIONAL PERIODS OF COLSTRIP UNIT #1 GOING ON LINE. THESE SAMPLES WILL BE DRIED AND PLACED IN AIR-TIGHT CONTAINERS AND STORED AT THE EVST LABORATORY SPECIMEN COLLECTION ARCHIVES FOR CHEMICAL ANALYSIS AT A FUTURE DATA WHEN MONIES CAN BE APPROPRIATED FOR THEIR ANALYSIS.

00000170
PROJECT TITLE:
MONITORING PLANT COMMUNITY CHANGES DUE TO FOSSIL FUEL POWER PLANTS IN EASTERN MONTANA
PROJECT SUPERVISOR:
JOHN E. TAYLOR
MONTANA STATE UNIV., DEPT. OF ANIMAL & RANGE SCIENCES
BOZEMAN, MT 59715
406-994-3721
PRIMARY SPONSOR:
U.S. EPA, CORVALLIS NAT. ENV. RESEARCH CENTER
ROBERT LEWIS
CORVALLIS, OR 97330
PRIMARY FUNDING AMOUNT:
102,595
TIME FRAME:
07 15 74 TO 07 14 76
LOCATION:
MT
ABSTRACT:
THE SCOPE OF THIS PROJECT MAY BE SEEN IN THE OBJECTIVES, WHICH ARE: A) TO RECORD NATIVE PLANT COMMUNITIES IN AREAS LIKELY TO BE AFFECTED BY FOSSIL FUEL POWER PLANTS AND IN AREAS ACTUALLY BEING AFFECTED, B) TO MONITOR PLANT SPECIES AND COMMUNITY RESPONSES TO ARTIFICIALLY APPLIED AIR POLLUTION STRESS, C) TO REFINE FIELD PROCEDURES FOR AERIAL PHOTO INTERPRETATION, DIVERSITY, PHENOLOGY, AND COVER DATA, D) TO COLLECT DATA TO BE USED IN SIMULATION MODELING, E) TO DEVELOP DETAILED VEGETATION MAPS OF STUDY AREAS.
TYPE OF STUDY:
THIS PROJECT IS A PART OF THE BIOENVIRONMENTAL EFFECTS OF COAL FIRED POWER PLANTS RESEARCH BEING CONDUCTED BY THE NATIONAL ENVIRONMENTAL RESEARCH CENTER, EPA, CORVALLIS, OREGON (DR. ROBERT LEWIS IS OVERALL PROJECT LEADER.) IT IS CLOSELY RELATED TO BIOMASS AND COMMUNITY DYNAMICS STUDIES BEING CONDUCTED BY SCIENTISTS FROM COLORADO STATE UNIVERSITY. IT ALSO SUPPORTS PROJECTS IN VERTEBRATE ANIMAL POPULATIONS, PLANT PHYSIOLOGY, LICHEN ECOLOGY, PLANT PATHOLOGY, AND INSECT ECOLOGY (ALL UNDER THE GENERAL EPA PROJECT).
REPORTS AND PUBLICATIONS:
1) TAYLOR, J. E., W. C. LEININGER, AND R. J. FUCHS. SITE DESCRIPTIONS AND EFFECTS OF COAL-FIRED POWER PLANT EMISSIONS ON PLANT COMMUNITY STRUCTURE. IN: THE BIOENVIRONMENTAL IMPACT OF A COAL-FIRED POWER PLANT. 1ST INTERIM REPORT, U.S. ENVIR. PROT. AGENCY, CORVALLIS, OR. 1974. 2) BASELINE VEGETATIONAL STUDIES NEAR COLSTRIP. PROC. MONT. ACAD. SCI./FT. UNION COAL SYMP. 1975.

00000171
PROJECT TITLE:
REMOTE SENSING OF RESOURCE DATA ON SOUTHEASTERN MONTANA RANGELANDS
PROJECT SUPERVISOR:
JOHN E. TAYLOR
MONTANA STATE UNIV., DEPT. OF ANIMAL AND RANGE SCIENCES
BOZEMAN, MT 59715
406-994-3721
PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION/RANN

```
   1800 G. ST. NW
   WASHINGTON, DC  20550
PRIMARY FUNDING AMOUNT:
   42,017
TIME FRAME:
   05 15 75 TO 06 30 76
LOCATION:
   MT
ABSTRACT:
   THE SCOPE OF THIS PROJECT MAY BE DISCERNED IN THE PROJECT
   OBJECTIVES, WHICH ARE:  1) TO ASSEMBLE FILES ON BOTH
   CURRENTLY AVAILABLE AND NEW REMOTE IMAGERY OF REPRESENT-
   ATIVE ECOSYSTEMS IN THE AREAS OF SOUTHEASTERN MONTANA
   SUBJECT TO STRIP MINING AND POWER GENERATING PLANTS,
   2) TO ESTABLISH BENCHMARK DATA BANKS OF GROUND TRUTH,
   IMAGE INTERPRETATION, MAPS, AND HISTORIC RECORDS OF
   NATURAL AND DISTURBED ECOSYSTEMS, 3) TO MONITOR ANY
   LAND USE CHANGES AND ANY UNCONTROLLED DISTURBANCES
   WHICH MAY OCCUR DUE TO STRIP MINING AND RELATED ACTIVITIES,
   4) TO PROVIDE A VARIETY OF REMOTE SENSING AND GROUND
   TRUTH DATA ON VEGETATION, SOILS, SURFACE DISRUPTION,
   EROSION, AND OTHER PERTINENT VARIABLES TO SCIENTISTS
   WORKING ON RELATED PROJECTS.
TYPE OF STUDY:
   PART OF "THE IMPACT OF COAL DEVELOPMENT IN THE FORT
   UNION BASIN AND NEIGHBORING STATES," UNIV. OF MONTANA


00000172
PROJECT TITLE:
   THE BIOENVIRONMENTAL IMPACT OF A COAL-FIRED POWER PLANT
INVESTIGATORS:
   CLANCY GORDON; JOHN TAYLOR; SHARON EVERSMAN; JERRY DODD;
   VERN DERR; ROBERT A. LEWIS
PROJECT SUPERVISOR:
   ERIC PRESTON
   U.S. EPA, CORVALLIS NAT. ECOL. RESEARCH LAB.
   200 SW 35TH ST.
   CORVALLIS, OR
COOPERATOR/COORDINATOR:
   UNIV. OF MONTANA
   MONTANA STATE UNIV.
   COLORADO STATE UNIV.
   U.S. NATIONAL OCEANIC & ATMOSPHERIC ADMIN.
PRIMARY SPONSOR:
   U.S. EPA, CORVALLIS NAT. ENV. RESEARCH CENTER
PRIMARY FUNDING AMOUNT:
   700,000
TIME FRAME:
   06 01 74 TO 06 30 78
LOCATION:
   MT
ABSTRACT:
   THIS IS AN INTERDISCIPLINARY APPROACH DESIGNED TO ASSESS
   THE EFFECTS OF COAL FIRED POWER PLANTS UPON A GRASSLAND
   ECOSYSTEM.  THE PRINCIPAL OBJECTIVE OF THIS PROGRAM IS
   TO DEVELOP AN IMPACT ASSESSMENT PROTOCOL WITH A TRULY
   PREDICTIVE POTENTIAL.  THIS PROTOCOL WILL BE DESIGNED
   WITH A VIEW TO ALLOW RATIONAL SITING DECISIONS TO BE
   MADE BEFORE DAMAGE TO THE ENVIRONMENT IS ACTUALLY SUSTAINED.
   MAJOR PROJECT ELEMENTS ARE THE STUDY OF LICHENS AS
   INDICATORS AND PREDICATORS OF POLLUTION; OF AIR QUALITY
   AND METEOROLOGY; ECOSYSTEM AND DIFFUSION MODELING;
   STUDIES OF PLANT COMMUNITY STRUCTURE; PRIMARY AND
   SECONDARY PRODUCERS; PLANT AND ANIMAL DISEASE; REMOTE
   SENSING; FIELD AND LABORATORY STUDIES IN MOST OF THE
   ABOVE AREAS; PROJECT SYNTHESIS AND INTEGRATION.


00000173
PROJECT TITLE:
   WILDLIFE INVENTORY OF COLSTRIP, MONTANA
PROJECT SUPERVISOR:
   ROBERT E. CARROLL
   ECOLOGICAL CONSULTING SERVICE
   AIRPORT WAY BUILDING WEST
   HELENA, MONTANA  59601
COOPERATOR/COORDINATOR:
   PUGET SOUND POWER AND LIGHT
PRIMARY SPONSOR:
   THE MONTANA POWER CO.
   CARL R. ANDERSON
   40 E. BROADWAY
   BUTTE, MT  59701
   406-723-5421
PRIMARY FUNDING AMOUNT:
   PROPRIETARY
TIME FRAME:
   01 01 72 TO CONTINUING
LOCATION:
   MT
ABSTRACT:
   WILDLIFE INVENTORY OF A 10 X 20 MILE AREA CENTERED ON
   COLSTRIP TO DETERMINE BASE LINE WILDLIFE POPULATION
   TYPES, DENSITY, DISTRIBUTION, FOOD HABITS, AND RANGE
   LAND USES.
REPORTS AND PUBLICATIONS:
   ANNUAL REPORT FOR EACH YEAR BEGINNING IN 1972 FILED WITH
   THE DEPARTMENT OF NATURAL RESOURCES.


00000174
PROJECT TITLE:
   AIR QUALITY MONITORING AT COLSTRIP, MONTANA
PROJECT SUPERVISOR:
   F. J. LABRIE, CHIEF ENGINEER
   THE MONTANA POWER COMPANY
```

BUTTE, MT 59701
COOPERATOR/COORDINATOR:
PUGET SOUND POWER AND LIGHT
PRIMARY SPONSOR:
THE MONTANA POWER COMPANY
PRIMARY FUNDING AMOUNT:
PROPRIETARY
TIME FRAME:
01 01 72 TO CONTINUING
LOCATION:
MT
ABSTRACT:
A NETWORK OF AIR QUALITY SAMPLING STATIONS SET UP SURROUNDING THE COLSTRIP PLANT SITE, MEASURING SO2, NOX, PARTICULATES AND FLUORIDES, USING BUBBLER SAMPLERS, HIGH-VOL SAMPLERS, SULFATION PLATES, FLUORIDE PLATES AND DUSTFALL JARS.
REPORTS AND PUBLICATIONS:
DATA NOT REDUCTED AND SUMMARIZED TOTALLY, BUT SOME DATA FILED WITH THE DEPARTMENT OF NATURAL RESOURCES AND THE DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES.

00000175
PROJECT TITLE:
INFRARED VEGETATION STUDY
PROJECT SUPERVISOR:
ROBERT E. CARROLL
ECOLOGICAL CONSULTING SERVICE
AIRPORT WAY BUILDING WEST
HELENA, MT 59601
COOPERATOR/COORDINATOR:
PUGET SOUND POWER AND LIGHT
PRIMARY SPONSOR:
THE MONTANA POWER CO.
CARL R. ANDERSON
40 E. BROADWAY
BUTTE, MT 59701
406-723-5421
PRIMARY FUNDING AMOUNT:
PROPRIETARY
TIME FRAME:
07 01 73 TO CONTINUING
LOCATION:
MT
ABSTRACT:
AERIAL INFRARED FILMING AND INTERPRETATION TO OBTAIN BASE LINE VEGETATION TYPES AND CONDITIONS IN THE 10 X 20 MILE AREA CENTERING ON COLSTRIP. THIS WILL BE CONDUCTED ANNUALLY FOR A NUMBER OF YEARS IN THE FUTURE TO MONITOR THE AREA FOR ANY CHANGES AND SIGNS OF STRESS.
REPORTS AND PUBLICATIONS:
10 X 20 MILE AREA INFRARED REPORT, COLSTRIP, MONTANA, TO THE MONTANA POWER COMPANY UTILIZING JUNE 22, 1973 AERIAL COLOR INFRARED -- FILED WITH THE DEPARTMENT OF NATURAL RESOURCES AND THE DEPARTMENT OF STATE LANDS.

00000176
PROJECT TITLE:
PRECIPITATION ANALYSIS, COLSTRIP, MONTANA
PROJECT SUPERVISOR:
ROBERT CARROLL
ECOLOGICAL CONSULTING SERVICE
AIRPORT WAY BUILDING WEST
HELENA, MT
COOPERATOR/COORDINATOR:
PUGET SOUND POWER & LIGHT
PRIMARY SPONSOR:
THE MONTANA POWER CO.
CARL R. ANDERSON
40 E. BROADWAY
BUTTE, MT
406-723-5421
PRIMARY FUNDING AMOUNT:
PROPRIETARY
TIME FRAME:
01 01 73 TO 12 30 75
LOCATION:
MT
ABSTRACT:
BASE LINE HYDROGEN ION (PH) DETERMINATION AND CHEMICAL CHANGE OVER TIME IN THE 10 X 20 AREA.

00000177
PROJECT TITLE:
STATISTICAL ANALYSIS OF WILDLIFE AND VEGETATIVE/HABITAT IN THE 10 X 20 AREA, COLSTRIP, MONTANA
PROJECT SUPERVISOR:
ROBERT E. CARROLL
ECOLOGICAL CONSULTING SERVICE
AIRPORT WAY BUILDING WEST
HELENA, MT 59601
COOPERATOR/COORDINATOR:
PUGET SOUND POWER AND LIGHT
PRIMARY SPONSOR:
THE MONTANA POWER COMPANY
CARL R. ANDERSON
40 E. BROADWAY
BUTTE, MT 59701
406-723-5421
PRIMARY FUNDING AMOUNT:
PROPRIETARY
TIME FRAME:
01 01 75 TO 01 01 76

LOCATION:
MT
ABSTRACT:
A MATHEMATICAL PROGRAM TO ANALYZE WILDLIFE AND VEGETATIVE/HABITAT DATA IN THE 10 X 20 AREA.

00000176
PROJECT TITLE:
DETERMINATION OF BASELINE LEVELS OF TRACE ELEMENTS AND POTENTIAL CHANGES OF TRACE ELEMENTS, SULFUR, AND FLUORIDE IN BIOTA NEAR COLSTRIP, MONTANA
INVESTIGATORS:
RICHARD W. PERKINS
JAMES J. O'TOOLE
FRANK MUNSHOWER
PROJECT SUPERVISOR:
C. C. GORDON
UNIV. OF MONTANA
MISSOULA, MT 59801
406-243-2671
COOPERATOR/COORDINATOR:
U.S. ERDA BATTELLE PACIFIC N.W. LAB
U.S. ERDA, AMES LAB.
MONTANA STATE UNIV.
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
PRIMARY FUNDING AMOUNT:
79,000
TIME FRAME:
06 01 75 TO 05 30 76
LOCATION:
MT
ABSTRACT:
1. TO DETERMINE THE BASELINE LEVELS OF TRACE ELEMENTS, SULFUR, AND FLUORIDE IN THE FLORA AND FAUNA OF THE COLSTRIP AREA OF MONTANA DURING THE PRE- AND POST-OPERATION OF COLSTRIP UNIT #1.
2. TO DETERMINE THE BASELINE LEVELS OF VARIOUS PHYSICAL PARAMETERS (PH, NO3, NH4, SELECTED TRACE METALS, FLUORIDE, SULFUR, AND COAL ACIDITY) OF THE RAINWATER IN THE COLSTRIP AREA DURING THE PRE- AND POST-OPERATIONAL PERIODS AT COLSTRIP UNIT #1.
3. TO DETERMINE THE FALLOUT OF TRACE ELEMENTS, SULFUR, FLUORIDE AT FOUR AIR MONITORING SITES WITHIN TEN MILES OF COLSTRIP DURING THE NEXT FOUR YEARS.

00000177
PROJECT TITLE:
A COOPERATIVE EVALUATION OF POTENTIAL AIR POLLUTION INJURY AND DAMAGE TO CONIFEROUS HABITATS ON NATIONAL FOREST LANDS NEAR COLSTRIP, MONTANA
INVESTIGATORS:
CLARENCE C. GORDON
UNIV. OF MONTANA, ENVIRONMENTAL STUDIES PROGRAM
MISSOULA, MT
406-243-2671
PROJECT SUPERVISOR:
U.S. FOREST SERVICE, STATE & PRIVATE FORESTRY
AIR POLLUTION GROUP
MISSOULA, MT 59801
COOPERATOR/COORDINATOR:
SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY
U.S. FOREST SERVICE--CUSTER NATIONAL FOREST, BLACK HILLS NATIONAL FOREST
MONTANA POWER COMPANY
PRIMARY SPONSOR:
U.S. FOREST SERVICE, SURFACE ENVIRONMENT AND MINING
GRANT DAVIS
145 GRAND AVE.
BILLINGS, MT 59102
PRIMARY FUNDING AMOUNT:
72,994
TIME FRAME:
06 15 75 TO 06 30 76
LOCATION:
MT
ABSTRACT:
COLSTRIP UNITS 1 & 2 WILL BE GOING ON LINE IN LATE 1975. IT IS DESIRABLE TO HAVE BASELINE DATA ON THE CONDITION OF PONDEROSA PINE TREES AND ASSOCIATED VEGETATION BEFORE ANY EFFECTS OF AIR POLLUTION FROM COLSTRIP REACH THE TIMBER STANDS. THE ENVIRONMENTAL PROTECTION AGENCY HAS FUNDED THE UNIVERSITY OF MONTANA TO STUDY AREAS SURROUNDING COLSTRIP. HOWEVER, THERE WERE NOT ENOUGH PLOTS IN THE CUSTER NATIONAL FOREST OR THE BLACK HILLS NATIONAL FOREST TO OBTAIN ADEQUATE BASELINE DATA IN ORDER TO MEASURE THE IMPACTS OF POWER PLANT POLLUTION ON TIMBER STANDS. THIS STUDY WILL COMPLEMENT EXISTING STUDIES IN PROGRESS BY UNIVERSITY OF MONTANA, MONTANA STATE UNIVERSITY, AND OTHERS. AFTER SEVERAL YEARS A FOLLOW-UP STUDY WILL BE CONDUCTED TO DETERMINE THE EFFECTS OF AIR POLLUTION ON THE TIMBER STANDS.
OBJECTIVES: I. TO ESTABLISH 12 PONDEROSA PINE STUDY PLOTS (THREE PLOTS BETWEEN COLSTRIP AND THE NORTHWEST BOUNDARY OF THE CUSTER NATIONAL FOREST AND NINE PLOTS WITHIN THE CUSTER NATIONAL FOREST) WHICH ARE POTENTIALLY HIGH AIR POLLUTION IMPACT AREAS OF THE ATMOSPHERIC EMISSIONS OF THE COAL-FIRED POWER PLANTS BEING BUILT AT COLSTRIP, MONTANA.
II. TO ESTABLISH 10 OTHER PONDEROSA STUDY PLOTS ON THE CUSTER NATIONAL FOREST WHICH ARE SELECTED ON THE BASIS OF THE MAJOR PONDEROSA PINE SITE CLASSES (NUMBERS 2, 3, 4, AND 5) WHICH ARE REPRESENTATIVE OF THOSE ON THE CUSTER NATIONAL FOREST.

III. TO EVALUATE PHYSICAL AND BIOLOGICAL CHARACTERISTICS OF THE 12 STUDY SITES DURING THE PERIOD OF JUNE 1, 1975 TO JUNE 1, 1976.
IV. TO CHARACTERIZE BASELINE CONDITIONS IN SELECTED GRASSLAND AREAS WITHIN THE FOREST BOUNDARY.

00000163
PROJECT TITLE:
REMOTE SENSING RESOURCES PROJECT
INVESTIGATORS:
LARRY REDDIN
ASHLAND, MT
PROJECT SUPERVISOR:
SCOTT FISHER
MONTANA DEPT. OF NATURAL RESOURCES & CONSERVATION
32 S. EWING
HELENA, MT 59601
406-449-3780
COOPERATOR/COORDINATOR:
FEDERATION OF ROCKY MOUNTAIN STATES
LOS ALAMOS SCIENTIFIC LAB
PRIMARY SPONSOR:
U.S. NATIONAL AERONATICS & SPACE ADMIN.
400 MARYLAND AVE. SW
WASHINGTON, DC 20546
202-755-2320
PRIMARY FUNDING AMOUNT:
10,500
TIME FRAME:
04 30 75 TO 10 07 76
LOCATION:
MT
ABSTRACT:
THE OBJECTIVES ARE: 1) TO PROVIDE BASE DATA ON LAND USE, SOILS, PLANT COMMUNITIES, PHYSIOGRAPHY, AND GEOLOGY FROM KNOWN LOCATIONS IN THE PROJECT AREA WHICH WILL SERVE AS AN INFORMATIONAL BASE FOR COMPUTER MAPPING BY COLORADO STATE UNIVERSITY USING ERTS TAPES; 2) TO TEST THIS TYPE OF INVENTORY ANALYSIS FOR POTENTIAL USE AS AN INITIAL RESOURCE GATHERING PROCEDURE FOR USE IN THE EFD CORRIDOR SELECTION METHODOLOGY. THE STUDY AREA INCLUDES THE AREA BETWEEN 106-107 DEGREES W. AND 45-46 DEGREES N.
BY MID-AUGUST, WE HOPE TO HAVE ALL THE COLOR INFRARED PHOTOGRAPHY FOR THIS AREA AT A SCALE OF 1:125,000.

0000181

PROJECT TITLE:
CONSTRUCTION WORKER PROFILE
PROJECT NUMBER:
10570042
PROJECT SUPERVISOR:
MOUNTAIN WEST RESEARCH, INC.
JAMES A. CHALMERS AND JUDITH GLAZNER
280 COLUMBINE ST. SUITE 301
DENVER, CO 80206
303-320-1970
PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
JEANNETTE STUDER
FRATT BLDG. 306A
BILLINGS, MT 59101
406-245-6711 X6665
PRIMARY FUNDING AMOUNT:
74,974
TIME FRAME:
02 01 75 TO 11 30 75
LOCATION:
MT ND WY UT AZ CO
ABSTRACT:

THE PURPOSE OF THIS PROJECT IS TO HELP INDIVIDUALS AND COMMUNITIES ANTICIPATE THE IMPACTS OF CONSTRUCTION PROJECTS ASSOCIATED WITH ENERGY DEVELOPMENT BY GATHERING DATA ON THE DEMOGRAPHIC, SOCIAL, ECONOMIC, HOUSING AND SERVICE PREFERENCE CHARACTERISTICS OF CONSTRUCTION WORKERS ASSOCIATED WITH COAL DEVELOPMENT PROJECTS. THE STUDY WILL BE COMPOSED OF SURVEYS ON RELEVANT CONSTRUCTION PROJECTS IN THE ROCKY MOUNTAIN REGION, ANALYSIS OF THE DATA AND DEVELOPMENT OF TOOLS FOR STANDARD FORECASTING PROCEDURES.

THE PRIMARY OBJECTIVES OF THE STUDY ARE AS FOLLOWS:

1. TO DEVELOP A BROAD-BASED SET OF PRIMARY DATA ON CONSTRUCTION PROJECTS AND ON CHARACTERISTICS OF CONSTRUCTION WORKERS THAT DESCRIBE THE SPECIFIC SOURCES OF IMPACT AND THE NATURE OF THE IMPACTS ALREADY BEING EXPERIENCED BY COMMUNITIES IN THE REGION.
2. TO DETERMINE FROM THESE DATA THE DEGREE OF STABILITY AND THE MAGNITUDE OF THE BASIC RELATIONSHIPS NECESSARY TO PREDICT THE ECONOMIC AND SOCIAL IMPACTS OF A CONSTRUCTION PROJECT ON NEARBY CITIES AND TOWNS.
3. TO CONSTRUCT AN IMPACT MODEL, DESCRIBE ITS LIMITS, AND TEST IT BY SEEING HOW WELL IT WOULD HAVE PREDICTED THE IMPACTS ASSOCIATED WITH ALREADY-COMPLETED PROJECTS.
4. TO DETERMINE THE APPROPRIATE USES OF THE MODEL ON THE BASIS OF THE RESULTS OF THE ANALYSIS OF THE DATA.

0000182

PROJECT TITLE:
WYOMING COMMUNITY TECHNICAL ASSISTANCE PROGRAM
PROJECT NUMBER:
10570037
PROJECT SUPERVISOR:
CHIEF OF STATE PLANNING
WYOMING DEPARTMENT OF ECONOMIC PLANNING AND DEVELOPMENT
720 W. 18TH ST.
CHEYENNE, WY 82001
307-777-7284
COOPERATOR/COORDINATOR:
WYOMING DEPARTMENT OF ECONOMIC PLANNING AND DEVELOPMENT
PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
JEANNETTE STUDER
FRATT BLDG. 306A
BILLINGS, MT 59101
406-245-6711 X6665
PRIMARY FUNDING AMOUNT:
260,000
TIME FRAME:
01 01 75 TO 12 31 76
LOCATION:
WY
ABSTRACT:

THE COMMUNITY TECHNICAL ASSISTANCE PROGRAM IS DEVELOPED TO ASSIST COMMUNITIES EXPERIENCING OR ANTICIPATED TO EXPERIENCE THE IMPACT OF ENERGY DEVELOPMENT. TECHNICAL MANPOWER AND PLANNING SUPPORT IS BEING PROVIDED TO IMPACT AREAS IN NORTHEASTERN AND SOUTHWESTERN WYOMING.

0000183

PROJECT TITLE:
APPLICATION AND EVALUATION OF PROCEDURES MANUAL FOR ASSESSING SOCIOECONOMIC IMPACT OF THE CONSTRUCTION AND OPERATION OF COAL UTILIZATION FACILITIES TO THE MISSOURI BASIN POWER PROJECT AT WHEATLAND, WYOMING
PROJECT NUMBER:
10570075
PROJECT SUPERVISOR:
KENNETH R. POTTER
WESTERN ANALYSIS
P.O. BOX 1518, FEDERAL BLDG.
RIVERTON, WY 82501
307-856-2494
PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
JEANNETTE STUDER
FRATT BLDG. 306A

BILLINGS, MT 59101
406-245-6711 X6665

PRIMARY FUNDING AMOUNT:
24,201

TIME FRAME:
03 27 75 TO 09 30 75

LOCATION:
WY

ABSTRACT:
A 'PROCEDURES MANUAL FOR ASSESSING THE SOCIOECONOMIC IMPACT OF COAL UTILIZATION FACILITIES' WAS DEVELOPED FOR THE OLD WEST REGIONAL COMMISSION BY BOOZ, ALLEN, AND HAMILTON, INC. THIS PROJECT HAS TWO PURPOSES. THE FIRST IS TO APPLY THE PROCEDURES MANUAL TO THE MISSOURI BASIN POWER PROJECT AT WHEATLAND, WYOMING, FOR A SOCIOECONOMIC IMPACT ASSESSMENT. THE SECOND IS TO EVALUATE THE PROCEDURES MANUAL IN TERMS OF ITS USEFULNESS AND ABILITY TO MEET ITS STATED GOALS OF PROVIDING A COMMON METHODOLOGY FOR ASSESSING SOCIOECONOMIC IMPACT.

00000184

PROJECT TITLE:
MONTANA COMMUNITY TECHNICAL ASSISTANCE PROGRAM

PROJECT NUMBER:
10570072

PROJECT SUPERVISOR:
DIRECTOR
MONTANA DEPT. OF COMMUNITY AFFAIRS
1424 9TH AVE.
HELENA, MT 59601
406-449-3494

COOPERATOR/COORDINATOR:
MONTANA DEPT. OF COMMUNITY AFFAIRS

PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
JEANNETTE STUDER
FRATT BLDG. 306A
BILLINGS, MT 59101
406-245-6711 X 6665

PRIMARY FUNDING AMOUNT:
268,062

TIME FRAME:
03 26 75 TO 03 31 77

LOCATION:
MT

ABSTRACT:
THE COMMUNITY TECHNICAL ASSISTANCE PROGRAM IS DEVELOPED TO ASSIST COMMUNITIES EXPERIENCING OR ANTICIPATED TO EXPERIENCE ENERGY DEVELOPMENT IMPACT. TECHNICAL MANPOWER, TRAINING PROGRAMS AND PLANNING SUPPORT IS BEING PROVIDED TO IMPACT AREAS IN EASTERN MONTANA.

00000185

PROJECT TITLE:
ECONOMIC STUDY OF THE DECKER-BIRNEY, MONTANA, COAL AREA

INVESTIGATORS:
M. C. JOHNSON

RESEARCH FACILITY:
UNIV. OF MONTANA, BUREAU OF BUSINESS & ECONOMIC RESEARCH
MISSOULA, MT 59801

PRIMARY SPONSOR:
MONTANA ENERGY ADVISORY COUNCIL

PRIMARY FUNDING AMOUNT:
1975 - 8,000

TIME FRAME:
12 01 74 TO 06 01 75

ABSTRACT:
THE DECKER-BIRNEY ECONOMIC STUDY WILL BE, IN MANY WAYS, AN EXTENSION OF RESEARCH CONCERNING THE ECONOMIC IMPACT OF COAL DEVELOPMENT IN EASTERN MONTANA RECENTLY COMPLETED BY THE BUREAU OF BUSINESS AND ECONOMIC RESEARCH AT THE UNIVERSITY OF MONTANA. THE DISTINGUISHING FEATURE OF THE DECKER-BIRNEY STUDY IS THAT IT WILL CENTER ON A SMALL SPATIAL AREA -- PARTS OF SEVERAL COUNTIES -- RATHER THAN A MULTICOUNTY REGION. THE STUDY AREA WILL CONSIST OF THE FOLLOWING COUNTY CENSUS DIVISIONS: BUSBY-DECKER IN BIG HORN COUNTY; ASHLAND-LAME DEER IN ROSEBUD COUNTY; AND STACEY AND OTTER IN POWDER RIVER COUNTY. THE DECKER-BIRNEY AREA ECONOMY WILL BE ANALYZED IN TERMS OF POPULATION, INCOME, AND EMPLOYMENT. AGRICULTURE, MINING, WOOD PRODUCTS, AND RECREATION WILL BE SINGLED OUT FOR SPECIAL ATTENTION. COMMUNITY INSTITUTIONS AND GOVERNMENTAL FINANCES AND SERVICES WILL BE DESCRIBED. PROJECTIONS OF POPULATION, EMPLOYMENT, AND INCOME TO 1980 AND 1985, CORRESPONDING TO ALTERNATIVE LEVELS OF COAL DEVELOPMENT WILL BE DEVELOPED AND THE OUTLOOK FOR THE INDUSTRIES LISTED ABOVE WILL BE DESCRIBED. A FINAL SECTION WILL BRING THE VARIOUS TOPICS TOGETHER IN AN INTEGRATED DISCUSSION OF THE IMPACT OF COAL-RELATED DEVELOPMENT.

00000186

PROJECT TITLE:
WATER USE AND COAL DEVELOPMENT IN EASTERN MONTANA: AN EVALUATION OF THE POTENTIAL ECONOMIC IMPACT

INVESTIGATORS:
P. E. POLZIN; M. C. JOHNSON

RESEARCH FACILITY:
UNIV. OF MONTANA, BUREAU OF BUSINESS & ECONOMIC RESEARCH
MISSOULA, MT 59801

PRIMARY SPONSOR:
UNIV. OF MONTANA
U.S. DEPT. OF INTERIOR, OFFICE OF WATER RESOURCES RESEARCH

PRIMARY FUNDING AMOUNT:
1974 - 18,000

1975 - 20,000
TIME FRAME:
09 01 73 TO 11 01 74
ABSTRACT:

THE REPORT DESCRIBES THE CURRENT ECONOMIC SITUATION IN THE REGION AND THE PRESENT STATE OF DEVELOPMENT OF WATER AND COAL RESOURCES. IT USES ALTERNATIVE PROJECTIONS OF COAL DEVELOPMENT OVER THE NEXT TEN YEARS AND ESTIMATES THE ECONOMIC IMPACT OF EACH ALTERNATIVE. EMPHASIS IS PLACED ON THE EFFECT ON EMPLOYMENT AND ON THE ECONOMIC WELL-BEING OF EASTERN MONTANA RESIDENTS. CONCERN FOR SOCIAL AND ENVIRONMENTAL IMPACTS IS EXERCISED, BUT THE RESEARCH DEALS SPECIFICALLY WITH THESE PROBLEMS. THE GOAL OF THE PROJECT WAS TO PROVIDE RELIABLE, USEFUL INFORMATION OF THE POTENTIAL DEVELOPMENT OF EASTERN MONTANA WATER AND COAL RESOURCES TO STATE AND LOCAL POLICY MAKERS, TO BUSINESSMEN AND THE GENERAL PUBLIC.

REPORTS AND PUBLICATIONS:

1. P. E. POLZIN. 'WATER USE AND COAL DEVELOPMENT IN EASTERN MONTANA.' NOVEMBER 1974. BUREAU OF BUSINESS & ECONOMIC RESEARCH, UNIV. OF MONTANA, MISSOULA; 2. P. E. POLZIN. 'WATER USE AND COAL DEVELOPMENT IN EASTERN MONTANA.' MONTANA BUSINESS QUARTERLY, AUTUMN 1974. BUREAU OF BUSINESS & ECONOMIC RESEARCH, UNIVERSITY OF MONTANA, MISSOULA.

00000187
PROJECT TITLE:
STUDY OF SOCIAL IMPACT OF COAL DEVELOPMENT IN THE DECKER-BIRNEY PLANNING AREA, MONTANA
INVESTIGATORS:
R. L. GOLD
RESEARCH FACILITY:
UNIV. OF MONTANA, INSTITUTE FOR SOCIAL SCI. RESEARCH
MISSOULA, MT 59801
PRIMARY SPONSOR:
MONTANA ENERGY ADVISORY COUNCIL
PRIMARY FUNDING AMOUNT:
1975 - 36,000
TIME FRAME:
07 01 74 TO 02 01 75
LOCATION:
MT
ABSTRACT:

THIS STUDY IS INTENDED TO SUPPLEMENT THE "DECKER-BIRNEY RESOURCES STUDY" DONE BY THE BUREAU OF LAND MANAGEMENT AND U.S. FOREST SERVICE IN 1971 AND 1972 BY ADDING INFORMATION ON A BROAD RANGE OF SOCIAL VARIABLES OF GREAT CONCERN TO RESIDENTS OF THE DECKER-BIRNEY PLANNING UNIT AND NEIGHBORING COMMUNITIES.

00000188
PROJECT TITLE:
SOCIOECONOMIC IMPACT ON RURAL COMMUNITIES OF DEVELOPING NEW MEXICO COAL RESOURCES.
PROJECT NUMBER:
RM-1651-16-406-CA
INVESTIGATORS:
STAN RANDALL
REGION 3
FEDERAL BUILDING
517 GOLD AVENUE SW
ALBUQUERQUE, NM 87101
DR. J. GRAY
NEW MEXICO STATE UNIVERSITY
LAS CRUCES, NM 88001
PROJECT SUPERVISOR:
EARL F. ALDON
ROCKY MTN. FOREST & RANGE EXP. STATION
240 WEST PROSPECT STREET
FORT COLLINS, CO 80521
COOPERATOR/COORDINATOR:
NAVAJO TRIBE
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
41000
TIME FRAME:
09 30 74 TO 06 30 75
LOCATION:
NM
ABSTRACT:

PROBLEM: ASSEMBLE AND SYSTEMATIZE APPROPRIATE SOCIOECONOMIC BASE DATA AND ADAPT FOR DECISION MAKERS. DETERMINE SOCIOLOGIC AND CULTURAL EFFECTS OF MINING.

OBJECTIVES: INVENTORY HUMAN AND INSTITUTION RESOURCES AND DETERMINE REACTION TO RATES OF COAL DEVELOPMENT FOR DIFFERENT SOCIAL GROUPS.

METHODS: GROUP INTERVIEWS AND DATA ASSEMBLY FROM EXISTING SOURCES.

STATISTICAL ANALYSIS: ANOVA.

REPORTS AND PUBLICATIONS:
WORK PLAN: JUNE 30, 1974
REPORTS: STUDY PLAN, FINAL REPORT, PUBLISHED ARTICLE.

00000189
PROJECT TITLE:
DEMONSTRATION PROGRAM FOR SERVING THE OCCUPATIONAL NEEDS OF EMERGING AND EXPANDING BUSINESS AND INDUSTRY IN NORTH DAKOTA
PROJECT NUMBER:
10570127
INVESTIGATORS:
TED RENNER
PROJECT SUPERVISOR:
CARROL E. BURCHIVAL, STATE DIRECTOR
NORTH DAKOTA STATE BOARD FOR VOCATIONAL EDUCATION
900 EAST BOULEVARD AVE.
BISMARCK, ND 58501
701-224-2259
PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
DR. KENNETH A. BLACKBURN
FRATT BUILDING, SUITE 306A
BILLINGS, MT 59101
406-245-6711 X6665
PRIMARY FUNDING AMOUNT:
92,000
FY 76 - 36,000
FY 77 - 56,000
TIME FRAME:
06 16 75 TO 06 30 77
LOCATION:
ND
ABSTRACT:
AN ASSESSMENT WILL BE MADE OF CURRENT AND PROJECTED OCCUPATIONAL NEEDS OF EMERGING BUSINESS AND INDUSTRY ASSOCIATED WITH THE DEVELOPMENT OF COAL AND WATER RESOURCES IN NORTH DAKOTA. THIS PROJECT WILL CONCERN ITSELF PRIMARILY WITH COAL GASIFICATION, POWER PLANTS, AND IRRIGATION RELATED DEVELOPMENT. THE ASSESSMENT IS TO INCLUDE THE PROJECTED NUMBER OF WORKERS AND THE KINDS OF JOBS THAT WILL BECOME AVAILABLE DUE TO THIS TYPE OF INDUSTRIALIZATION. (2) A TASK ANALYSIS WILL BE MADE FOR EACH OF THE DIFFERENT JOB CLASSIFICATIONS AND A BASIC TRAINING PROGRAM AND A COURSE OF STUDY WILL BE DEVELOPED WITH INDUSTRY INPUT SO AS TO PROVIDE TRAINED MANPOWER BASED ON INDUSTRY¤S CURRENT NEED. (3) AN ASSESSMENT WILL BE MADE OF EXISTING VOCATIONAL EDUCATION PROGRAMS THAT ARE PRESENTLY PROVIDING SOME RELATED TRAINING THAT MIGHT BE MODIFIED SO AS TO BETTER MEET THE NEEDS OF THE NEW SKILL DEMANDS IDENTIFIED. WHEN NEEDED AND WHERE APPLICABLE NEW PROGRAMS WILL BE INITIATED TO MEET THE IDENTIFIED NEED. (4) A DEMONSTRATION OF ONE ACTUAL TRAINING PROGRAM WILL BE CONDUCTED AND EVALUATED BY THE ASSOCIATED INDUSTRY AS WELL AS PART OF THE PROJECT WITH SPECIAL EMPHASIS DEVOTED TO PLACEMENT OF MINORITY, DISADVANTAGED AND PERSONS WITH SPECIAL NEEDS. (6) PROJECT DATA AND PROJECT PROGRESS WILL BE REPORTED AND SHARED WITH THE MEMBER STATES OF THE OLD WEST REGIONAL COMMISSION AS WELL AS WITH THE STATE BOARDS FOR VOCATIONAL EDUCATION OF EACH STATE IN THE OLD WEST REGIONAL COMMISSION.

00000190
PROJECT TITLE:
ASSESSMENT OF TEMPORARY AND MOBILE PUBLIC FACILITIES
PROJECT NUMBER:
10570188
PROJECT SUPERVISOR:
JAMES H. SILVERTHORN
HOWARD, NEEDLES, TAMMEN & BERGENDOFF
P.O. BOX 3101
CASPER, WY 82601
307-265-7199
PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
JEANNETTE STUDER
FRATT BUILDING, SUITE 306A
BILLINGS, MT 59101
406-245-6711 X6665
PRIMARY FUNDING AMOUNT:
45,142
TIME FRAME:
07 01 75 TO 01 31 76
LOCATION:
MT ND SD NE WY
ABSTRACT:
THE PURPOSE OF THE PROJECT IS TO IDENTIFY THE STATE OF THE ART OF TEMPORARY AND MOBILE PUBLIC FACILITIES, TO ASSESS THE PERFORMANCE AND OVERALL FEASIBILITY OF SUCH FACILITIES FOR COMMUNITIES AND CONSTRUCTION PROJECTS IN THE OLD WEST REGION AND TO ASSESS THE FEASIBILITY OF A POOL OF MOBILE FACILITIES MOVING FROM ONE CONSTRUCTION SITE TO ANOTHER. IN ADDITION TO THE ABOVE OBJECTIVES, STANDARDS AND GUIDELINES FOR MOBILE AND TEMPORARY PUBLIC FACILITIES WILL ALSO BE RECOMMENDED. THE TYPES OF PUBLIC FACILITIES TO BE CONSIDERED WILL INCLUDE EDUCATIONAL, LIBRARY, MEDICAL, SEWER, WATER, RECREATIONAL, HOUSING AND SEMIPUBLIC.

00000191
PROJECT TITLE:
NORTH DAKOTA COMMUNITY TECHNICAL ASSISTANCE PROGRAM
PROJECT NUMBER:
10570131
PROJECT SUPERVISOR:
DIRECTOR, LEWIS & CLARK 1805 REGIONAL COUNCIL FOR DEVELOPMENT
BOX 236
MANDAN, ND 58554

701-663-6587

PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
JEANNETTE STUDER
FRATT BUILDING, SUITE 306A
BILLINGS, MT 59101

PRIMARY FUNDING AMOUNT:
301,312

TIME FRAME:
06 15 75 TO 06 30 77

LOCATION:
ND

ABSTRACT:

THE COMMUNITY TECHNICAL ASSISTANCE PROGRAM IS A PROGRAM DEVELOPED TO ASSIST COMMUNITIES EXPERIENCING, OR ANTICIPATED TO EXPERIENCE, THE IMPACT OF ENERGY DEVELOPMENT. TECHNICAL MANPOWER, PLANNING SUPPORT AND FEASIBILITY STUDIES ARE BEING PROVIDED TO IMPACT AREAS IN WESTERN NORTH DAKOTA.

00000192

PROJECT TITLE:
IMPACTS OF COAL DEVELOPMENT ALTERNATIVES

PROJECT NUMBER:
ND 3332

INVESTIGATORS:
F. L. LEISTRITZ: R. G. FRAASE: D. M. SENECHAL
NORTH DAKOTA STATE UNIV.
DEPT. OF AG. ECONOMICS
FARGO, ND 58102
701-237-7441

PROJECT SUPERVISOR;
A. G. HAZEN
NORTH DAKOTA STATE UNIV.
AG. EXP. STATION
FARGO, ND 58102

PRIMARY SPONSOR:
NATURAL GAS & PIPELINE CO. OF AMERICA

SECONDARY SPONSOR:
U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF WATER RESOURCES RESEARCH
WASHINGTON, DC 20460

PRIMARY FUNDING AMOUNT:
1975 - 97,334
1975 - 70,000

TIME FRAME:
07 01 73 TO 06 30 78

LOCATION:
ND

ABSTRACT:

OBJECTIVES: 1. IDENTIFY ALTERNATIVE METHOD OF UTILIZING WESTERN NORTH DAKOTA LIGNITE RESOURCES TO MEET ENERGY NEEDS.
2. IDENTIFY AND EVALUATE EFFECTS OF ALTERNATIVE DEVELOPMENT PATTERNS ON LOCAL ECONOMIC ACTIVITY.
3. IDENTIFY THE FACTORS THAT AFFECT THE LEVEL AND PATTERN OF DEVELOPMENT OF NORTH DAKOTA LIGNITE.
APPROACH: IDENTIFICATION OF TECHNICALLY FEASIBLE COAL DEVELOPMENT ALTERNATIVES AND ESTIMATION OF RESOURCE REQUIREMENTS AND COSTS FOR EACH WILL BE ACCOMPLISHED THROUGH THE ANALYSIS OF SECONDARY DATA ON NATIONAL ENERGY NEEDS, SUPPLIES OF ENERGY RESOURCES IN OTHER REGIONS, AND TRANSPORTATION COSTS FOR VARIOUS ENERGY FORMS. ENGINEERING ESTIMATES AVAILABLE FROM SECONDARY SOURCES WILL BE VALUABLE IN DETERMINING COSTS AND RESOURCE REQUIREMENTS ECONOMIC IMPACT ANALYSES WILL BE MADE FOR EACH DEVELOPMENT ALTERNATIVE. INCOME, EMPLOYMENT, AND POPULATION PROJECTIONS WILL BE USED TO ESTIMATE AND IDENTIFY ECONOMIC AND SOCIAL IMPACTS.

00000193

PROJECT TITLE:
SOCIO-ECONOMIC IMPACT STUDY OF COAL AND OIL SHALE BOOM TOWNS

INVESTIGATORS:
JOHN S. GILMORE: MARY K, DUFF: DEAN C. CODDINGTON

PROJECT SUPERVISOR:
JOHN S. GILMORE
DENVER RESEARCH INSTITUTE
2135 E. WESLEY
DENVER, CO
303-753-2611

PRIMARY SPONSOR:
FEDERAL ENERGY ADMINISTRATION
JOAN HOCK
ROOM 711, FEDERAL BLDG. 13TH & PENNSYLVANIA NW
WASHINGTON, DC 20461

PRIMARY FUNDING AMOUNT:
74,500

TIME FRAME:
05 15 75 TO 01 15 76

LOCATION:
CO MT WY UT

ABSTRACT:

OBJECTIVES:
1. FURNISH INFORMATION IDENTIFYING THE FINANCIAL PROBLEMS CONFRONTING COMMUNITIES FACING RAPID GROWTH FROM ENERGY AND MINERAL DEVELOPMENT, PARTICULARLY THE PUBLIC SECTOR FINANCING PROBLEMS.
2. EXAMINE ALTERNATIVE MEANS OF SOLVING THESE PROBLEMS.
3. EXAMINE PROSPECTIVE FEDERAL ROLES IN ALLEVIATING THESE PROBLEMS.
4. FURNISH INFORMATION INPUTS TO THE OFFICE OF ENERGY CONSERVATION AND ENVIRONMENT, F.E.A., TO ASSIST IN ITS POLICY DEVELOPMENT FUNCTION. FOUR COMMUNITIES HAVE BEEN SELECTED FOR DETAILED STUDY:
1. OIL SHALE COUNTRY IN COLORADO (RIO BLANCO COUNTY),
2. ROCK SPRINGS, GREEN RIVER, WYOMING,
3. EMEREY COUNTY UTAH (COAL AND URANIUM DEVELOPMENT)
4. SHERIDAN COUNTY, WYOMING AND BIG HORN COUNTY, MONTANA. IN EACH COMMUNITY DEVELOPMENT PROFILES WILL BE PRESENTED TO THE YEAR 2000. EXPECTED REVENUES AND EXPENDITURES TO ACCOMMODATE THE NEW POPULATION WILL BE FORECAST AND A CASH FLOW ANALYSIS OF LOCAL, STATE AND FEDERAL SURPLUSES AND DEFICITS WILL BE DONE. THIS WILL INVOLVE A REVIEW AND COMPARISON OF THE FOUR STATES INSTITUTIONAL CAPABILITY TO HANDLE GROWTH. IT WILL IDENTIFY GAPS IN FINANCING CAPABILITIES AND SUGGEST ROLES THE FEDERAL GOVERNMENT MIGHT UNDERTAKE TO AID WESTERN COMMUNITIES FACING RAPID MINERAL DEVELOPMENT. IT WILL INVOLVE ESTIMATING INCREMENTAL POPULATION INCREASES AND THE PUBLIC (AND SOME PRIVATE) SECTOR INFRASTRUCTURE REQUIREMENTS OF THE NEW POPULATION. IDEALLY, THE ANALYSIS WILL DERIVE A PROPORTION OF COMMUNITY INFRASTRUCTURE COST TO BASIC CAPITAL INVESTMENT AND SUGGEST NEW METHODS OF FINANCING SUCH.

00000194

PROJECT TITLE:
THE SOCIAL, ECONOMIC, AND LAND USE IMPACTS OF A HYPOTHETICAL COAL PROCESSING COMPLEX APPLIED TO THE FORT UNION LIGNITE REGION

INVESTIGATORS:
JOHN S. GILMORE: MARY K. DUFF: DICK DORAN: DEAN C. CODDINGTON

PROJECT SUPERVISOR:
JOHN C. GILMORE
DENVER RESEARCH INSTITUTE
235 WESLEY
DENVER, CO 80210
303-753-2611

PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
HOWARD SMITH
2100 M STREET, NW
WASHINGTON, DC 20037
202-634-1562

PRIMARY FUNDING AMOUNT:
237,668

TIME FRAME:
09 13 73 TO 09 12 75

LOCATION:
ND SD MT

ABSTRACT:

THIS PROJECT INVLOVED ESTIMATING THE SOCIAL, ECONOMIC, AND LAND USE IMPACTS RELATED TO SECOND GENERATION COAL CONVERSION TECHNOLOGY ON A RURAL ISOLATED COMMUNITY IN THE WESTERN UNITE STATES. THE INTENT WAS TO DEVELOP A METHODOLOGY FOR ESTIMATING IMPACTS WHICH WOULD BE APPLICABLE TO OTHER COMMUNITIES FACING SIMILAR DEVELOPMENT.

THE PROJECT INVOLVED DEVELOPING A PROFILE OF A HYPOTHETICAL COAL-OIL-GAS COMPLEX (COG) IN TERMS OF LAND, LABOR AND CAPITAL REQUIRED. THEN AN AREA WHICH TYPIFIES WESTERN COMMUNITIES WAS SELECTED TO SUPERIMPOSE THE COG COMPLEX (CONSTRUCTION OF SUCH IS NOT ANTICIPATED BEFORE 1985.)

TWO REPRESENTATIVE AREAS WERE SELECTED FOR DETAILED STUDY:

1. RURAL AREAS - THREE COUNTIES IN SOUTHWEST NORTH DAKOTA, AND

2. URBAN AREAS - FIVE COUNTIES, INCLUDING BISMARCK-MANDAN AREA.

FORECASTS OF NEW COAL-RELATED DEVELOPMENT, EMPLOYMENT, AND POPULATION AND INCOME INCREASES TO 1985 WERE PREPARED. COG COMPLEX EMPLOYMENT AND POPULATION AND INCOME WERE SUPERIMPOSED ON THIS FORECAST. PUBLIC (WATER, SEWER, RECREATION, ETC. AND PRIVATE (HOUSING, HEALTH, UTILITIES, RETAIL SPACE, ETC.) WERE ESTIMATED. THE COST OF THIS INFRASTRUCTURE WAS ESTIMATED.

FEDERAL, STATE, AND LOCAL TAX REVENUES FLOWING FROM THE DEVELOPMENT WERE PREPARED AND COMPARED WITH EXPENDITURE REQUIREMENTS FOR A PUBLIC SECTOR CASH FLOW ANALYSIS USING TWO DIFFERENT ASSUMPTIONS:
1. DIRECT COMPARISON OF ALL EXPENDITURES AND ALL REVENUES;
2. ASSUMING ALL CAPITAL OUTLAYS DEFERRED AND FINANCED BY 20 YEAR PUBLIC BONDS.

THE CHANGES IN ECONOMIC STRUCTURE ARE PRESENTED ON A GROWTH MANAGEMENT MODEL. THE MODEL INDICATES CAPITAL INVESTMENT NEEDED TO ACCOMMODATE THE NEW POPULATION, AND THE RELATIONSHIP BETWEEN INVESTMENT, LAND AND LABOR.

GROWTH MANAGEMENT FUNCTIONS AND IMPLEMENTATION TOOLS WERE SUGGESTED.

THE SOCIETAL CHANGES RESULTING FROM INDUSTRIALIZATION AND URBANIZATION OF BOTH AREAS WERE MODELED ACCORDING TO SOCIAL STRUCTURE, POLICY, CULTURE AND INSTITUTIONAL.

00000195

PROJECT TITLE:
DEVELOPMENT OF A PROCEDURES MANUAL FOR ASSESSING THE SOCIO-ECONOMIC IMPACT OF THE CONSTRUCTION AND OPERATION OF COAL GASIFICATION AND LIQUIFACTION PLANTS

PROJECT NUMBER:
10470001

INVESTIGATORS:
DAVID WILLIAMS

PROJECT SUPERVISOR:
JOHN G. REILLY
BOOZ, ALLEN & HAMILTON, INC.
1025 CONNECTICUT AVE NW
WASHINGTON, D. C.
202-293-3600

PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
ALAN B. MINIER
1730 K ST. NW, SUITE 426
WASHINGTON, DC, 20006
202-967-3491

PRIMARY FUNDING AMOUNT:
32,322

TIME FRAME:
03 11 74 TO 06 11 74

STATUS:
COMPLETED 06 11 74

LOCATION:
MT NE ND SD WY

ABSTRACT:

PROBLEM: TO DEVISE A DETAILED METHODOLOGY FOR EVALUATING SOCIO-ECONOMIC IMPACTS IN AREAS FACED WITH RAPID GROWTH AND DEVELOPMENT.

OBJECTIVE: A MANUAL FOR PROCEEDING TO EVALUATE SAME.

APPROACH: CONTRACTOR DEVISED A DOLLAR-FLOW MODEL, SO THAT THE IMPACTS MEASURED MAY BE MOST PROPERLY IDENTIFIED AS ECONOMIC. ANALYSIS PROVIDES DETAILED FORMULAE FOR DATA

INPUTS AND MANIPULATION OF DATA INPUTS. MANUAL SUGGESTS SOURCES FOR INPUT DATA IN THE FIVE OLD WEST STATES.

REPORTS AND PUBLICATIONS:
"A PROCEDURES MANUAL." BOOZ, ALLEN & HAMILTON, INC., OWRC REPORT #5, 1974. OLD WEST REGIONAL COMMISSION, 1730 K ST. NW, SUITE 426, WASHINGTON, DC 20006

00000196

PROJECT TITLE:
ECONOMIC, SOCIAL, AND ENVIRONMENTAL IMPACT STUDY OF THE PROPOSED COAL GASIFICATION PROJECT OF THE MICHIGAN-WISCONSIN PIPELINE COMPANY AND NORTH AMERICAN COAL CORPORATION

PROJECT NUMBER:
10470043

INVESTIGATORS:
RALPH LUKEN

PROJECT SUPERVISOR:
THOMAS E. CARROLL
THOMAS E. CARROLL ASSOCIATES
1700 PENNSYLVANIA AVE. NW
WASHINGTON, DC 20006
202-296-8465

PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
ALAN B. MINIER
1730 K ST. NW, SUITE 426
WASHINGTON, DC 20006
202-967-3491

PRIMARY FUNDING AMOUNT:
50,000

TIME FRAME:
02 25 74 TO 07 25 74

STATUS:
COMPLETED 11 01 74

LOCATION:
ND

ABSTRACT:
PROBLEM: AT INCEPTION OF THE STUDY, THE MICHIGAN WISCONSIN PIPELINE COMPANY HAD APPLIED FOR A CONDITIONAL WATER PERMIT FOR WATER TO BE USED IN CONNECTION WITH MINING AND UTILIZATION OF LIGNITE FOR MANUFACTURING A NATURAL GAS SUBSTITUTE. THIS WAS THE FIRST SUCH APPLICATION IN NORTH DAKOTA AND THE OLD WEST REGION.

OBJECTIVES: TO PREPARE AN IN-DEPTH ANALYSIS OF THE ENVIRONMENTAL, SOCIAL, AND ECONOMIC IMPACTS OF COAL DEVELOPMENT IN MERCER COUNTY.

APPROACH: 1. A PROFILE OF THE 3-4 COUNTY REGION.
2. EMPLOYMENT, POPULATION, AND INCOME FORECASTS
3. PROJECTED DISTRIBUTION OF COMMERCIAL AND RESIDENTIAL SERVICES WITHIN THE SERVICE AREA.
4. ASSOCIATED SUPPORT SERVICES AND FACILITIES IDENTIFIED.
5. FINANCIAL IMPACT OF EXPANSION OF SUPPORT SERVICES AND FACILITIES.
6. PRESENTATION OF ALTERNATIVE GROWTH PATHS AND CONSEQUENCES ASSOCIATED WITH THOSE ALTERNATIVES:

REPORTS AND PUBLICATIONS:
OWRC REPORT #7, NOV. 1974. OLD WEST REGIONAL COMMISSION, 1730 K ST. NW SUITE 426, WASHINGTON, DC 20006

00000197

PROJECT TITLE:
PREPARE A STUDY OF THE LEGAL AND REGULATORY FRAMEWORK OF CERTAIN ISSUES ARISING FROM RAPID AND SUBSTANTIAL POPULATION GROWTH

PROJECT NUMBER:
10470004

INVESTIGATORS:
JEFFREY J. SCOTT

PROJECT SUPERVISOR:
WILLIAM G. CAMPBELL
KUTAK, ROCK, COHEN, CAMPBELL, GARFINKLE & WOODWARD
600 WOODMEN TOWER
OMAHA, NE 68102
402-346-6000

PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
ALAN B. MINIER
1730 K STREET NW, SUITE 426
WASHINGTON, DC 20006
202-967-3491

PRIMARY FUNDING AMOUNT:
25,000

TIME FRAME:
06 03 74 TO 09 09 74

STATUS:
COMPLETED 09 09 74

LOCATION:
MT WY ND

ABSTRACT:

PROBLEM: TO IDENTIFY THE LEGAL AND REGULATORY TOOLS AND OPTIONS AVAILABLE TO COMMUNITIES TO BE IMPACTED BY RAPID POPULATION GROWTH.

OBJECTIVE: A BASELINE STUDY OF PROBLEMS ENCOUNTERED AND TOOLS AVAILABLE TO MEET THOSE PROBLEMS, WITH SPECIFIC ATTENTION TO THE PRESENT STATUTES OF MONTANA, NORTH DAKOTA, AND WYOMING.

APPROACH: 1. REVIEW LAWS OF MONTANA, WYOMING, AND NORTH DAKOTA RE:
A. ESTABLISHMENT OF NEW TOWNS
B. DISTINGUISHING FEATURES OF EXISTING CLASSES OF MUNICIPAL STRUCTURES
C. TRADITIONAL ZONING AUTHORITY
D. CURRENTLY AUTHORIZED ALTERNATIVE LAND USE MECHANISMS

2. CONTACT WITH CONCERNED PARTIES IN THE THREE STATES AND ELSEWHERE IN THE U.S.
3. CONTACT ELSEWHERE FOR COMPARATIVE GROWTH EXPERIENCE.
4. SURVEY OF CONTEMPORARY LITERATURE AND SUMMARY OF ALL KNOWN RESPONSES TO THE PROBLEM.
5. SYNOPSIS OF PROCEDURAL AND SUBSTANTIVE TOOLS.
6. PRINCIPLES OF MODEL LEGISLATION.

REPORTS AND PUBLICATIONS:
KUTAK, ROCK, COHEN. "LEGAL AND REGULATORY FRAMEWORK OF COAL DEVELOPMENT IN THE OLD WEST REGION." OWRC REPORT #9; SEPTEMBER, 1974; OLD WEST REGIONAL COMMISSION, 1730 K ST., NW, SUITE 426, WASHINGTON, D.C. 20006. 6 VOLUMES. VOLUME ONE SUMMARY IS FREE FOR FIRST COPY TO ANY USER.

00000198

PROJECT TITLE:
REVIEW RELEVANCY OF "MULTIPLE-OBJECTIVE PLANNING FOR MULTI-PURPOSE WATER RESOURCE SYSTEM: A STRUCTURE FOR REGIONAL WATER RESOURCE DEVELOPMENT"

PROJECT NUMBER:
10570025

INVESTIGATORS:
DIRK LIJESEN

PROJECT SUPERVISOR:
NICOLAOS V. ARVANITIDIS
INTASA
1120 CRANE ST.
MENLO PARK, CA 94025
415-323-9011

PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
ALAN B. MINIER
1730 K ST. NW, SUITE 426
WASHINGTON, DC 20006
202-967-3491

PRIMARY FUNDING AMOUNT:
5,000

TIME FRAME:
12 23 74 TO 02 28 75

STATUS:
COMPLETED 03 18 75

LOCATION:
MT NE ND SD WY

ABSTRACT:

PROBLEM: TO EXPLORE THE FEASIBILITY AND DESIRABILITY OF DEVELOPING A COMMON PLANNING AND EVALUATION METHO-

DOLOGY BROAD ENOUGH TO ENCOMPASS THE WIDE RANGE OF CONCERNS (ECONOMIC, SOCIAL, AND ENVIRONMENTAL) THAT STEM FROM ENERGY DEVELOPMENT.

OBJECTIVES: SEE ABOVE. CONCLUSION WAS GENERALLY NEGATIVE.

APPROACH: INTASA HAS DONE MULTIOBJECTIVE PLANNING WORK FOR THE CORPS OF ENGINEERS, USING A SYSTEM OF SOCIAL, ECONOMIC, AND ENVIRONMENTAL ACCOUNTS. THE CONTRACTOR COMPARED EXPERIENCE AND PRODUCT OF THAT EFFORT TO PROBLEMS PECULIAR TO WESTERN ENERGY DEVELOPMENT. IN THE COURSE OF THE EXAMINATION, CONTRACTOR REVIEWED A NUMBER OF FAMILIAR STUDIES, INCLUDING THE NORTHERN GREAT PLAINS RESOURCES PROGRAM AND THE EASTERN POWDER RIVER BASIN ENVIRONMENTAL IMPACT STATEMENT.

REPORTS AND PUBLICATIONS:
LETTER REPORT AVAILABLE ON REQUEST FROM THE OLD WEST REGIONAL COMMISSION, 1730 K ST. NW, SUITE 426, WASHINGTON, DC 20006.

00000199

PROJECT TITLE:
NORTH DAKOTA LEGAL AND REGULATORY FRAMEWORK FOR MANAGING ENERGY DEVELOPMENT AND ITS IMPACTS

PROJECT NUMBER:
10570028

INVESTIGATORS:
IRVIN B. NODLAND

PROJECT SUPERVISOR:
ERIC GAJESKI
OFFICE OF THE GOVERNOR
STATE CAPITOL BLDG.
BISMARCK, ND 58501
701-258-6607

PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
ALAN B. MINIER
1730 K ST. NW, SUITE 426
WASHINGTON, DC 20006
202-967-3491

PRIMARY FUNDING AMOUNT:
25,000

TIME FRAME:
12 02 74 TO 06 01 75

LOCATION:
ND

ABSTRACT:
PROBLEM: POTENTIAL FOR RAPID POPULATION GROWTH IN NORTH DAKOTA DUE TO ENERGY DEVELOPMENT.

OBJECTIVE: TO PREPARE A CITIZEN'S MANUAL FOR POPULAR USE THAT WILL BRING LEGAL EXPERTISE TO BEAR ON A VARIETY OF OF ROLES THAT MAY BE ASSUMED BY THE CITIZEN.

APPROACH: 1. IDENTIFYING THE NEED FOR SUCH A MANUAL.
2. ANALYSIS OF THREE DIFFERENT STRATEGIES REGARDING DEVELOPMENT - ACCOMODATION, RETENTION OF BENEFITS, PREVENTION - AND THE LEGAL LIMITS ASSOCIATED WITH EACH.
3. PREPARATION OF THE MANUAL.

REPORTS AND PUBLICATIONS:
FINISHED PRODUCT IS ANTICIPATED EARLY IN THE FALL OF 1975.

00000200

PROJECT TITLE:
LEGAL AND REGULATORY STRUCTURE FOR THE STATE OF WYOMING

PROJECT NUMBER:
10470023

PROJECT SUPERVISOR:
PETER MAXFIELD
UNIVER. OF WYOMING LAW SCHOOL
LARAMIE, WY
307-766-5262

PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
ALAN B. MINIER
1730 K ST., NW, SUITE 426
WASHINGTON, DC 20006
202-967-3491

PRIMARY FUNDING AMOUNT:
25,000

TIME FRAME:
06 28 74 TO 08 31 75

LOCATION:
WY

ABSTRACT:

PROBLEM: POTENTIAL RAPID POPULATION GROWTH IN WYOMING DUE TO ENERGY DEVELOPMENT.

OBJECTIVE: TO PREPARE A MANUAL, TECHNICALLY CORRECT BUT COMPREHENSIBLE TO THE LAYMAN, WHICH EXPLAINS THE EXISTING LEGAL AND REGULATORY FRAMEWORK OF THE STATE AS IT RELATES TO LOCAL AND STATE GOVERNMENT ABILITY TO DEAL WITH POPULATION IMPACTS.

APPROACH: 1. COMPILATION, ANALYSIS, AND EVALUATION OF EXISTING WYOMING LAWS RELATING TO POPULATION GROWTH.
2. ASSESSMENT OF OPTIONS IN VARYING CIRCUMSTANCES OF GROWTH.
3. INVESTIGATION OF AREAS OF PARTICULAR CONCERN TO COUNTY AND CITY GOVERNMENTS.
4. REVIEW AND ANALYSIS OF CONSTITUTIONAL AND JUDICIAL LAW RELATED TO GROWTH MANAGEMENT.

REPORTS AND PUBLICATIONS:
PICARD AND HENNIG. "A NON-LEGAL PRIMER: EMPLOYING LAND USE LAWS TO CONTROL POPULATION GROWTH IN WYOMING." TO BE AVAILABLE FROM OLD WEST REGIONAL COMMISSION, 1730 K ST. NW, WASHINGTON, DC 20006

00000201

PROJECT TITLE:
ASSESS THE LEGAL AND REGULATORY FRAMEWORK IN LIGHT OF POPULATION INCREASE ESTIMATES FOR CIRCLE, MONTANA AND PRESENT ALTERNATIVES TO THE COMMUNITY THAT WILL ENCOURAGE THE INVOLVEMENT OF LOCAL LEADERSHIP

PROJECT NUMBER:
10570118

INVESTIGATORS:
CHRISTOPHER BUSLEE

PROJECT SUPERVISOR:
STEVEN G. BROWN
DEPT. OF COMMUNITY AFFAIRS
CAPITOL STATION
HELENA, MT 59601
406-449-3111

PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
ALAN B. MINIER
1730 K ST., NW SUITE 426
WASHINGTON, DC 20006
202-967-3491

PRIMARY FUNDING AMOUNT:
25,000

TIME FRAME:
05 15 75 TO 05 01 76

LOCATION:
MT

ABSTRACT:
PROBLEM: POTENTIAL FOR RAPID POPULATION GROWTH IN CIRCLE, MONTANA, DUE TO PROPOSED FERTILIZER PLANT.
OBJECTIVES: EXPLORE LEGAL AND REGULATORY TOOLS AVAILABLE FOR MANAGING POTENTIAL GROWTH.

APPROACH: 1. GRANTEE SHAL INVESTIGATE IMMEDIATE AND EXPECTED PROBLEMS FACING CIRCLE. 2. GRANTEE SHALL ASSESS THE EXISTING LEGAL AND REGULATORY FRAMEWORK IN LIGHT OF THE RESULTS OF THE FIRST TASK. 3 GRANTEE SHALL ASSESS ALTERNATIVES AVAILABLE TO CIRCLE DECISION-MAKERS. 4. GRANTEE SHALL DRAW UPON CIRCLE EXPERIENCE TO PREPARE GUIDELINES FOR OTHER MONTANA COMMUNITIES WHICH ARE OR MAY BE SIMILARLY SITUATED.

00000202
PROJECT TITLE:
THE SOCIOLOGICAL IMPACT OF AN ELECTRICAL GENERATING PLANT
INVESTIGATORS:
AUDIE BLEVINS, JR.; JAMES G. THOMPSON; CARL ELLIS; GARY WATTS, UNIV. OF WYOMING, DEPT. OF BUSINESS & ECONOMIC RESEARCH
PROJECT SUPERVISOR:
ROGER L. HAYEN; AUDIE BLEVINS, JR.
UNIV. OF WYOMING
P. O. BOX 3925, UNIV. STATION
LARAMIE, WY 82071
307-766-5141
COOPERATOR/COORDINATOR:
BURNS & MCDONNELL
RICK NORTON
P. O. BOX 173
KANSAS CITY, MO 64141
PRIMARY SPONSOR:
BASIN ELECTRIC POWER COOPERATIVE
316 N. 5TH ST.
BISMARCK, ND 58501
701-223-0441
SECONDARY SPONSORS:
MISSOURI BASIN POWER PROJECT
1810 CAPITOL AVE.
CHEYENNE, WY 82001
307-635-4261
PRIMARY FUNDING AMOUNT:
27,994
TIME FRAME:
08 05 74 TO 08 31 75
LOCATION:
WY
ABSTRACT:
A STUDY TO ASSESS IN DETAIL THE SOCIAL IMPACT OF THE CONSTRUCTION OF A COAL-FIRED ELECTRICAL GENERATING PLANT NEAR WHEATLAND, WYOMING. DATA WERE GATHERED THROUGH PERSONAL INTERVIEWS AND A MAIL SURVEY.

00000203
PROJECT TITLE:
SOCIOECONOMIC IMPACT OF THE LARAMIE RIVER STATION
INVESTIGATORS:
GARY WATTS; ALLEN VANDER MEULEN; BOB SMIDT; WALLACE DUNCAN; STEVE STREEPER
PROJECT SUPERVISOR:
ROGER L. HAYEN
UNIV. OF WYOMING
P. O. BOX 3925, UNIV. STATION
LARAMIE, WY 82071
307-766-5141
COOPERATOR/COORDINATOR:
BURNS & MCDONNELL
RICK NORTON
P. O. BOX 173
KANSAS CITY, MO 64141
816-333-4375
PRIMARY SPONSOR:
BASIN ELECTRIC POWER COOPERATIVE
316 N. 5TH ST.
BISMARCK, ND 58501
701-223-0441
SECONDARY SPONSORS:
MISSOURI BASIN POWER PROJECT
1810 CAPITOL AVENUE
CHEYENNE, WY 82001
307-635-4261
PRIMARY FUNDING AMOUNT:
28,373
SECONDARY FUNDING AMOUNTS:
4,500 ; 5,000
TIME FRAME:
05 20 74 TO 08 31 75
LOCATION:
WY
ABSTRACT:
THE PURPOSE OF THE PROJECT IS TO DEVELOP THE SOCIOECONOMIC PORTION OF AN ENVIRONMENTAL IMPACT STATEMENT FOR THE CONSTRUCTION OF A 1500 MEGAWATT COAL-FIRED ELECTRICAL GENERATING FACILITY NEAR WHEATLAND, WYOMING. DATA WERE GATHERED FROM A NUMBER OF PRIMARY AND SECONDARY SOURCES, AND PROJECTIONS WERE MADE UTILIZING ECONOMIC BASE MODELS, MULTIVARIATE STATISTICAL MODELS, AND COMPUTERIZED SENSITIVITY MODELS.
REPORTS AND PUBLICATIONS:
DRAFT ENVIRONMENT IMPACT STATEMENT TO BE PUBLISHED BY FEA, WASHINGTON, D.C. IN SEPTEMBER, 1975.

00000204

PROJECT TITLE:
COMPARABLE SITUATIONS ANALYSIS OF THE MISSOURI BASIN POWER PROJECT

INVESTIGATORS:
GARY WATTS; ALLEN VANDER MEULEN; KEREN MEISTER; BOB SMIDT

PROJECT SUPERVISOR:
ROGER L. HAYEN
UNIV. OF WYOMING, DIV OF BUS. AND ECON. RESEARCH
P. O. BOX 3925, UNIV. STATION
LARAMIE, WY 82071
307-766-5141

COOPERATOR/COORDINATOR:
BURNS & MCDONNELL
RICK NORTON
P. O. BOX 173
KANSAS CITY, MO 64141
816-333-4375

PRIMARY SPONSOR:
BASIN ELECTRIC POWER COOPERATIVE
316 N. 5TH ST.
BISMARCK, ND 58501
701-223-0441

SECONDARY SPONSORS:
MISSOURI BASIN POWER PROJECT
1610 CAPITOL AVE.
CHEYENNE, WY 82001
307-635-4261

PRIMARY FUNDING AMOUNT:
8,666

TIME FRAME:
06 05 74 TO 03 01 75

STATUS:
WY MT SD ND CO AZ

ABSTRACT:
A QUALITATIVE ANALYSIS OF SOCIOECONOMIC IMPACT RESULTING FROM THE CONSTRUCTION OF COAL-FIRED ELECTRICAL GENERATING PLANTS AT EIGHT LOCATIONS IN THE ROCKY MOUNTAIN REGION. DATA WAS GATHERED THROUGH PERSONAL INTERVIEWS WITH KEY COMMUNITY LEADERS AND RECORDED IN THE FORM OF TRIP REPORTS.

00000205

PROJECT TITLE:
ESTIMATE ECONOMIC, SOCIAL AND CULTURAL CONSEQUENCES OF COAL AND OIL SHALE DEVELOPMENT TO SUPPORT INTEGRATED ASSESSMENT STUDIES.

PROJECT NUMBER:
EPA - 547

PROJECT SUPERVISOR:
U.S. DEPT. OF AGRICULTURE, ECONOMIC RESEARCH SERVICE
WASHINGTON, DC 20250
202-447-7133

PRIMARY SPONSOR:
U.S. ENVIRONMENTAL PROTECTION AGENCY
401 M ST. SW
WASHINGTON, DC 20460
202-755-2673

PRIMARY FUNDING AMOUNT:
FY 75 - 460,000 ; FY 76 - 460,000

TIME FRAME:
06 01 75 TO 06 01 77

LOCATION:
MT

ABSTRACT:
1. IMPACT OF ENERGY DEVELOPMENT IN THE NORTHERN GREAT PLAINS ON EMPLOYMENT, INCOME AND POPULATION OF RURAL COMMUNITIES.
A. DEVELOP AND TEST METHODS FOR ESTIMATING AND ANALYZING SECONDARY EMPLOYMENT CHANGES INDUCED FROM DIRECT EMPLOYMENT CHANGES IN MINING AND RELATED ACTIVITIES.
B. DEVELOP AND TEST METHODS APPROPRIATE FOR ESTIMATING AND ANALYZING POPULATION CHANGES INDUCED FROM CHANGES IN EMPLOYMENT IN IMPACTED COMMUNITIES.
C. DEVELOP AND TEST METHODS FOR ESTIMATING AND ANALYZING INCOME CHANGES INDUCED FROM CHANGES IN EMPLOYMENT IN IMPACTED COMMUNITIES.
2. IMPACT OF ENERGY DEVELOPMENT IN THE NORTHERN GREAT PLAINS ON LOCAL GOVERNMENT FINANCES AND SERVICES.
A. ANALYZE STATE SEVERENCE TAX LAWS AND OTHER FINANCIAL INSTRUMENTS IN TERMS OF REVENUE POTENTIAL FOR PROVIDING FUNDS FOR IMPACTED LOCAL GOVERNMENTS.
B. DESCRIBE AND ANALYZE THE IMPACT OF COAL DEVELOPMENT ON COMMUNITIES AND MAKE PRELIMINARY ESTIMATES OF SHORT TERM FUTURE IMPACTS.
C. ANALYZE INTERRELATIONSHIP OF LOCAL GOVERNMENT EXPENDITURES TO EMPLOYMENT, POPULATION, INCOME, AGE STRUCTURE AND OTHER SOCIOECONOMIC VARIABLES IN THE NORTHERN GREAT PLAINS.

00000206

PROJECT TITLE:
A SOCIAL IMPACT STUDY OF CONSTRUCTING COLSTRIP GENERATING PLANTS #3 AND #4

INVESTIGATORS:
PAT JOBES; TED CLACK, FRANK SMOYER; RAYMOND L. GOLD

PROJECT SUPERVISOR:
GORDON BROWDER
UNIV. OF MONTANA
MISSOULA, MT

PRIMARY SPONSOR:
MONTANA DEPT. OF NATURAL RESOURCES AND CONSERVATION
MONTANA DEPT. OF SOCIAL AND REHABILITATION SERVICES

HELENA, MT 59601
PRIMARY FUNDING AMOUNT:
20,000
TIME FRAME:
12 01 74 TO 10 31 75
LOCATION:
MT
ABSTRACT:

THE PURPOSE OF THIS PROJECT WAS TO STUDY THE IMPACT OF THE PROPOSED CONSTRUCTION OF COLSTRIP GENERATING PLANTS #3 AND #4 ON THE PEOPLE LIVING IN AND AROUND ROSEBUD COUNTY. A LENGTHY QUESTIONNAIRE WAS ADMINISTERED TO A REPRESENTATIVE SAMPLE OF RESIDENTS OF ROSEBUD COUNTY SOUTH OF THE YELLOWSTONE RIVER, EXCLUDING THE NORTHERN CHEYENNE RESERVATION. THE RESEARCH TEAM ALSO INTERVIEWED RESIDENTS OF THE SAME AREA WHOM THE LOCALS IDENTIFIED AS REPRESENTING ALL THE KNOWN VIEWPOINTS AND SOCIAL GROUPINGS.

REPORTS AND PUBLICATIONS:

1. 'A SOCIAL IMPACT STUDY OF COLSTRIP GENERATING PLANTS #3 AND #4: SUMMARY OF INTERVIEW DATA,' JULY 31, 1974.
2. 'SOCIAL IMPACT OF EXISTING AND PROPOSED COAL DEVELOPMENT: A SURVEY OF THE ROSEBUD COUNTY STUDY AREA RESIDENTS,' AUGUST 30, 1974

00000207
PROJECT TITLE:
PRIVATE OPINIONS AND PUBLIC DECISIONS REGARDING THE USE OF WATER FROM THE YELLOWSTONE RIVER DRAINAGE FOR COAL DEVELOPMENT: A STUDY OF THE SOCIAL IMPACT OF THE ALLOCATION OF LARGE PORTIONS OF WATER FROM THE YELLOWSTONE RIVER DRAINAGE TO COAL-RELATED INDUSTRIAL DEVELOPMENT.
INVESTIGATORS:
MIKE HOWARD; ANNE S. WILLIAMS
PROJECT SUPERVISOR:
LEE FAULKNER
MONTANA STATE UNIV., INSTITUTE OF APPLIED RESEARCH
BOZEMAN, MT 59715
406-994-3835
COOPERATOR/COORDINATOR:
MONTANA DEPT. OF NATURAL RESOURCES & CONSERVATION
PRIMARY SPONSOR:
U.S. DEPT. OF INTERIOR, OFFICE OF WATER RESEARCH & TECH.
PRIMARY FUNDING AMOUNT:
27,475
TIME FRAME:
01 01 75 TO 12 31 75
LOCATION:
MT
ABSTRACT:

THIS PROJECT WAS DESIGNED PRIMARILY TO ENCOURAGE PUBLIC DIALOGUE ON THE QUESTIONS OF PRIORITIES, NEEDS AND POTENTIAL IMPACTS OF WATER USE FOR COAL DEVELOPMENT DURING THE THREE-YEAR MORATORIUM ON WATER ALLOCATION IN THE YELLOWSTONE RIVER BASIN.

TWO MAJOR PHASES ARE INVOLVED. IN THE FIRST, THE RESEARCH PHASE, THREE METHODS ARE BEING APPLIED: 1) INFORMATION IS OBTAINED ON WATER USE AND COAL DEVELOPMENT PLANS, ACTIONS AND OPTIONS THROUGH IN-DEPTH INTERVIEWS WITH DECISION-MAKERS AND INFLUENTIAL PERSONS IN AGENCIES, INDUSTRY, THE LEGISLATURE AND PRESSURE GROUPS. 2) A PROBABILITY SAMPLE OF RESIDENTS OF THE STUDY AREA, THROUGH RESPONSES TO A MAIL QUESTIONNAIRE PROVIDES DATA ON PRIORITIES AND OPINIONS CONCERNING WATER USE FOR COAL DEVELOPMENT, AND THE IMPACTS THEY WOULD EXPECT FROM INCREASED DEVELOPMENT OF THE COAL RESOURCES IN THE AREA. 3) DATA FROM MANY SOURCES CONCERNING PRESSURES FOR CHANGES IN WATER USE, LEGISLATIVE TRENDS CONCERNING WATER AND COAL DEVELOPMENT, INFORMATION ON LAWSUITS ALSO PROVIDES IMPORTANT BACKGROUND AGAINST WHICH TO ASSESS THE INFORMATION OBTAINED BY METHODS ONE AND TWO ABOVE.

THE IMPLEMENTATION PHASE INVOLVES COMBINING THE RESULTS OF THE RESEARCH PHASE INTO A MEANINGFUL PUBLIC PRESENTATION AND A WRITTEN SUMMARY, BOTH IN LAYMAN'S TERMS. THE PRESENTATION IS TO BE GIVEN IN SEVERAL FORUMS THROUGHOUT THE STUDY AREAS TO STIMULATE PUBLIC DIALOGUE AND INVOLEMENT. THE SUMMARY IS TO BE DISTRIBUTED IN CONJUNCTION WITH THESE FORUMS. FINALLY, THE EFFECTIVENESS OF THE PROGRAM AS A TOOL FOR DIALOGUE BETWEEN DECISION-MAKERS AND THE PUBLIC IS TO BE EVALUATED.

00000208
PROJECT TITLE:
NORTHERN CHEYENNE RESEARCH PROJECT: LIFE SUPPORT SYSTEMS
INVESTIGATORS:
BILL MANNING
PROJECT SUPERVISOR:
NORTHERN CHEYENNE RESEARCH PROJECT
RICHARD MONTEAU
BOX 248
BUSBY, MT 59016
406-592-3616
PRIMARY SPONSOR:
U.S. DEPT. OF H.E.W., OFFICE OF NATIVE AMERICAN PROGRAMS
WASHINGTON, DC 20201
PRIMARY FUNDING AMOUNT:
150,000
TIME FRAME:
06 01 75 TO 11 30 75
LOCATION:
MT
ABSTRACT:

THE NORTHERN CHEYENNE RESEARCH PROJECT (NCRP) IS AN

ONGOING RESEARCH EFFORT WHICH OPERATES UNDER THE DIRECTION OF THE NORTHERN CHEYENNE TRIBAL COUNCIL AND THE PEOPLE OF THE NORTHERN CHEYENNE TRIBE. IT DOES NOT FUNCTION AS A PART OF, NOR IS IT CONTROLLED BY, THE BUREAU OF INDIAN AFFAIRS. ITS PRINCIPAL PURPOSE IS TO ASSESS IN DEPTH THE POTENTIAL IMPACTS TO NORTHERN CHEYENNE LAND AND PEOPLE RESULTING FROM PROPOSED ENERGY DEVELOPMENT ON AND NEAR THE RESERVATION. PROJECT STAFF ARE CURRENTLY DEVELOPING RESEARCH PROGRAMS AIMED AT SECURING RELIABLE ENVIRONMENTAL, SOCIAL, LEGAL AND CULTURAL INFORMATION. THE DATA GATHERED FROM THESE RESEARCH PROGRAMS WILL BE DISSEMINATED TO THE TRIBE, PROVIDING THE INFORMATION BASE NEEDED BY THE NORTHERN CHEYENNE TO CRITICALLY ASSESS PROPOSED ENERGY DEVELOPMENT ON THE RESERVATION AND HOW IT WILL AFFECT THEIR LIVES. DECISIONS OF FAR - REACHING CONSEQUENCE WILL SOON BE MADE.

EXAMPLES OF SPECIFIC RESEARCH UNDERWAY INCLUDE THE FOLLOWING: A) A DETAILED SOCIAL IMPACT RESEARCH PROGRAM IS PRESENTLY UNDERWAY. SOCIOECONOMIC CONDITIONS ON THE RESERVATION ARE BEING STUDIED. IT IS HOPED THAT SUCH AN ANALYSIS WILL PROVIDE INSIGHT INTO HOW TO MAXIMIZE POTENTIAL BENEFITS FROM ENERGY DEVELOPMENT ON AND NEAR THE RESERVATION, WHILE AT THE SAME TIME PROVIDING MAXIMUM PROTECTION TO NORTHERN CHEYENNE CULTURE. B) LEGAL RESEARCH IS BEING CONDUCTED TO DETERMINE NORTHERN CHEYENNE WATER RIGHTS. RESEARCH INTO THE TRIBE'S COURT SYSTEM IS BEING CARRIED OUT IN AN ATTEMPT TO IMPROVE IT'S ABILITY TO ADJUST TO PRESSURES OF POPULATION GROWTH. TRIBAL LEGISLATION IS BEING STUDIED AND NEW LAWS FORMULATED TO COPE WITH ANTICIPATED LEGAL PROBLEMS RESULTING FROM POTENTIAL ENERGY DEVELOPMENT.

OTHER PROJECTS OF A WIDE RANGING NATURE ARE BEING DONE, ADDITIONAL INFORMATION CAN BE OBTAINED BY CONTACTING THE RESEARCH OFFICE.

00000209

PROJECT TITLE:
A COMPARATIVE CASE STUDY OF THE IMPACT OF COAL DEVELOPMENT ON THE WAY OF LIFE OF PEOPLE IN THE COAL AREAS OF EASTERN MONTANA AND NORTHEASTERN WYOMING

PROJECT SUPERVISOR:
RAYMOND L. GOLD
UNIV. OF MONTANA, COMMUNITY SERVICE & RESEARCH PROGRAM
MISSOULA, MT
406-243-5411

PRIMARY SPONSOR:
NORTHERN GREAT PLAINS RESOURCES PROGRAM
DENVER FEDERAL CENTER, BLDG. 67
DENVER, CO 80225

PRIMARY FUNDING AMOUNT:
57,875

TIME FRAME:
0[illegible] 01 73 TO 06 30 74

STATUS:
COMPLETED 06 30 74

LOCATION:
MT WY

ABSTRACT:
THE PURPOSE OF THIS ETHNOGRAPHIC STUDY WAS TO PRESENT THE VIEWS, THOUGHTS, FEELINGS, AND REACTIONS OF PEOPLE LIVING IN THE COAL AREAS OF EASTERN MONTANA AND NORTHEASTERN WYOMING REGARDING THE IMPACT WHICH COAL DEVELOPMENT IS HAVING ON THESE RESIDENTS' WAY OF LIFE. RESULTS OF THE QUALITATIVE RESEARCH IS OF ASSISTANCE TO THOSE WHO ARE INVOLVED IN DECISIONS ABOUT ENERGY RESOURCES WHICH WILL SO FATEFULLY AFFECT THIS PART OF THE NATION, THOSE WHO ARE CHARGED WITH PLANNING FOR AND DEALING WITH THE SOCIAL COSTS OF THESE DECISIONS, AND THOSE WHOSE LIVES AND LIFE-STYLES ARE CHANGING AS A RESULT OF COAL-RELATED INDUSTRIAL GROWTH AND DEVELOPMENT.

REPORTS AND PUBLICATIONS:
'A COMPARATIVE CASE STUDY OF THE IMPACT OF COAL DEVELOPMENT ON THE WAY OF LIFE OF PEOPLE IN THE COAL AREAS OF EASTERN MONTANA AND NORTHEASTERN WYOMING: FINAL REPORT,' NORTHERN GREAT PLAINS RESOURCES PROGRAM, JUNE 30, 1975.

00000210

PROJECT TITLE:
CO2 ACCEPTOR PROCESS FOR PRODUCING PIPELINE QUALITY GAS FROM LIGNITE

INVESTIGATORS:
J. D. SUDBURY; E. GORIN; G.P. CURRAN; C. E. FINK

RESEARCH FACILITY:
CONOCO COAL DEVELOPMENT CO., RESEARCH DIV.
LIBRARY, PA 15129

PRIMARY SPONSOR:
U.S. ERDA, OFFICE OF COAL RESEARCH
AMERICAN GAS ASSOCIATION

PRIMARY FUNDING AMOUNT:
1973 - 4,450,000
1974 - 6,860,000
1975 - 7,000,000

TIME FRAME:
01 01 60 - INDEFINITE

LOCATION:
SD PA

ABSTRACT:

THIS RESEARCH PROGRAM IS DIRECTED TO PERFORM TASKS ESSENTIAL TO CONTINUED DEVELOPMENT OF THE CARBON DIOXIDE ACCEPTOR PROCESS FOR MAKING HIGH BTU GAS FROM COAL. CONSTRUCTION OF THE 30 TON PER DAY PLANT IS COMPLETE. TASK I REQUIRED CONTINUED OPERATION TO TEST IMPACT OF DIFFERENT COALS, AND DIFFERENT DOLOMITES ON THE PROCESSING VARIABLES. TASK II IS TO INSTALL AND OPERATE A METHANATION FACILITY AS AN INTEGRAL PART OF THE GASIFICATION PLANT. TASK III IS TO PERFORM BASIC SUPPORT STUDIES TO PROVIDE DATA NECESSARY FOR PLANT OPERATION AND/OR PROCESS EVALUATION. TASK IV IS TO EVALUATE ALTERNATIVE PROJECTS WHICH COULD BE DEVELOPED IN THIS BASIC PILOT PLANT. TASK V REQUIRES PREPARATION OF THE PLANT FOR ANY SUBSEQUENT PROGRAMS DEEMED AS DESIRABLE.

REPORTS AND PUBLICATIONS:

CONSOLIDATION COAL COMPANY, RESEARCH & DEVELOPMENT REPORT NO. 16 TO THE OFFICE OF COAL RESEARCH, U.S. DEPARTMENT OF THE INTERIOR, UNDER CONTRACT NO. 14-01-000-415; (1) INTERIM REPORT NO. 1, PIPELINE GAS FROM LIGNITE GASIFICATION-A FEASIBILITY STUDY (FEBRUARY, 1965). U.S. DEPARTMENT OF COMMERCE, NATIONAL TECHNICAL INFORMATION SERVICE PB-16687, PB-166818; (2)INTERIM REPORT NO. 3 PHASE II-BENCH-SCALE RESEARCH ON CSG PROCESS (JANUARY, 1970). BOOK 1, STUDIES ON MECHANICS OF FLUO-SOLIDS SYSTEMS. GPO. CATALOG NO. 163. 10: 16/INT3/BOOK 1. (3) BOOK 2, LABORATORY PHYSICO-CHEMICAL STUDIES. GPO CATALOG NO. 163.10: 16/INT3/BOOK 2; (4) BOOK 3, "OPERATION OF THE BENCH-SCALE CONTINUOUS GASIFICATION UNIT. GPO CATALOG NO. 163.10:16/INT3/BOOK 3; (5)INTERIM REPORT NO. 4, PIPELINE GAS FROM LIGNITE GASIFICATION-CURRENT COMMERCIAL ECONOMICS. GPO CATALOG NO9 163910: 16/INT4; (6) INTERIM REPORT NO. 5, PHASE III AND PHASE IV-A DESIGN AND CONSTRUCTION OF THE CSG PILOT PLANT, RAPID CITY, SOUTH DAKOTA. ISSUED BY THE OFFICE OF COAL RESEARCH, NOVEMBER 30, 1973; (7)INTERIM REPORT, CONSOL SYNTHETIC GAS PILOT PLANT OPERATIONS JANUARY, 1972-JUNE, 1973. SUBMITTED TO THE OFFICE OF COAL RESEARCH/AMERICAN GAS ASSOCIATION, AUGUST 1973.

00000211

PROJECT TITLE:
IN-SITU GASIFICATION OF THICK, DEEPLY-BURIED WESTERN COAL DEPOSITS

INVESTIGATORS:
A. MAIMONI; J.S. KAHN

RESEARCH FACILITY:
LAWRENCE LIVERMORE LABORATORY
CHEMISTRY & MATERIALS SCIENCE DEPT.
LAWRENCE LIVERMORE LAB EARTH SCIENCES DIV.
LIVERMORE, CA 94550

PRIMARY SPONSOR:
U.S. ERDA, DIV. OF APPLIED TECHNOLOGY

PRIMARY FUNDING AMOUNT:
1975 - 3,300,000

TIME FRAME:
07 01 72 - CONTINUING

LOCATION:
WY MT CA

ABSTRACT:

A SIGNIFICANT PORTION OF U.S. COAL RESERVES ARE LOCATED IN THICK, DEEP BEDS IN THE WESTERN STATES. THE LLL PROGRAM IS DESIGNED TO DEMONSTRATE THE FEASIBILITY OF A NEW CONCEPT FOR IN SITU GASIFICATION OF THESE DEPOSITS. THE CONCEPT INVOLVES SHATTERING OF THE COAL IN PLACE WITH CONVENTIONAL EXPLOSIVES IN A PATTERN OF DRILLED HOLES. THE GASIFICATION PROCESS IS THEN INITIATED BY INJECTING AN OXYGEN AND WATER MIXTURE TO THE TOP OF THE SHATTERED REGION AND ESTABLISHING A COMBUSTION FRONT/REACTION ZONE WHICH WILL PROPAGATE DOWNWARD THROUGH THE BED. THE PRODUCE GASES SHOULD BE A MIXTURE OF METHANE, CARBON DIOXIDE, AND WATER VAPOR. THESE WILL BE WITHDRAWN THROUGH HOLES COMPLETED AT THE BOTTOM OF THE COAL BED. THE R&D PROGRAM NOW IN PROGRESS IS A MULTIFACETED EFFORT INVOLVING THEORETICAL AND CALCULATIONAL RESEARCH ON THE TECHNIQUES OF PRODUCING THE SHATTERED BED AND UNDERSTANDING THE KINETICS OF THE REACTIONS REQUIRED TO SUCCESSFULLY PRODUCE PIPELINE QUALITY GAS; LABORATORY EXPERIMENTS ON THE DETAILS OF COAL FRACTURING PHENOMENA AND OPERATION OF THE COMBUSTION/REACTION ZONE UTIL-

IZING SIMULATION EQUIPMENT AND INITIAL FIELD EXPERIMENTS ON FRACTURING IN SHALLOW COAL DEPOSITS. A SITE EXPLORATION AND SELECTION PROGRAM TO IDENTIFY A SUITABLE LOCATION FOR THE FIRST FIELD PROTOTYPE EXPERIMENT IS UNDERWAY AND WILL BE FOLLOWED BY LARGER SCALE FIELD EXPERIMENTS IN FUTURE YEARS.

REPORTS AND PUBLICATIONS:

1. H. G. HIGGINS. 'A NEW CONCEPT FOR IN SITU COAL GASIFICATION,' UCRL-51217, REV. 1 SEPT. 1972 (NTIS); 2. D. R. STEPHENS, 'ECONOMIC ESTIMATES OF THE LLL CONCEPT OF IN SITU COAL GASIFICATION,' UCRL-51340, FEBRUARY, 1973 (NTIS).

00000212

PROJECT TITLE:

HYDROCARBON UTILIZATION

INVESTIGATORS:

J. S. BALL; G. U. DINNEEN

RESEARCH FACILITY:

U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
BARTLESVILLE ENERGY RESEARCH CENTER
P. O. BOX 1398
BARTLESVILLE OK 74003
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
LARAMIE ENERGY RESEARCH CENTER
PO BOX 3395 UNIVERSITY STATION
LARAMIE, WY 87070

PRIMARY SPONSOR:

U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.

PRIMARY FUNDING AMOUNT:

1973 - 1,700,000
1974 - 1,558,000
1975 - 1,800,000

TIME FRAME:

01 01 75 TO 01 01 80

LOCATION:

OK WY

ABSTRACT:

THE PURPOSE OF THIS PROJECT IS TO PROVIDE METHODS OF IMPROVING EFFICIENCY IN THE UTILIZATION OF TRANSPORTATION FUELS FROM PETROLEUM RESIDUUM, NATURALLY OCCURRING TARS, OIL SHALE AND COAL SO THAT THEY CAN BE USED AS ALTERNATE LIQUID FUELS. SOME OF THE AREAS OF INVESTIGATION WILL BE MODIFICATION OF PROCESSES FOR REFINING ALTERNATE LIQUID FUELS, ENGINE AND FUEL SELECTION FOR REDUCED FUEL CONSUMPTION, RECYCLING WASTE OILS TO EXPAND SUPPLIES, AND DEVELOPING METHODS TO ANALYZE HEAVY OILS AND RESIDUUM. WORK IS PROCEEDING IN MOST AREAS OF THIS PROJECT WITH COMPLETION EXPECTED IN 1980.

REPORTS AND PUBLICATIONS:

(1)F. M. CARLSON AND C. S. LAND. THE ERROR IN GAS DRIVE CALCULATIONS CAUSED BY IGNORING COMPRESSIBILITY AND SOLUTION EFFECTS. BUMINES RI 7672, 1974, 18 PP. (2) C. S. LAND AND F. M. CARLSON. OPTIMUM GAS SATURATION FOR MAXIMUM OIL RECOVERY FROM DISPLACEMENT BY WATER. BUMINES RI 7911, 1974, 28 PP. (3)L. C. MARCHANT, L. A. JOHNSON, ET AL. PROPERTIES OF UTAH TAR SANDS--THREEMILE CANYON AREA, P.R. SPRING DEPOSIT. BUMINES RI 7923, 1974, 14PP. (4)L. Z. SHUCK, K. H. FROHNE,ET AL. DIRECTIONAL ACOUSTIC VELOCITY DISTRIBUTION IN A PETROLEUM RESERVOIR. SOC. PETROL. ENG., AIME, 49TH ANN. FALL MEETING, HOUSTON, TEX., OCT. 6-9, 1974, PREPRINT NO 5147-A. (5)L. Z. SHUCK AND T. W. KEECH, JR. NOISE CHARACTERISTICS OF OIL WELLS AND RESERVOIRS. SOC. PETROL. ENG., AIME, 49TH ANN. FALL MEETING, HOUSTON, TEX., OCT. 6-9, 1974, PREPRINT NO. 5147-B. (6)J. A. WASSON. EVALUATION BUMINES IC 8637, 1974, 21 PP.

00000213

PROJECT TITLE:

STACK GAS CLEANUP

INVESTIGATORS:

E. A. SONDREAL; P. H. TUFTE

RESEARCH FACILITY:

U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
GRAND FORKS ENERGY RESEARCH CENTER
GRAND FORKS, ND 58201

PRIMARY SPONSOR:

U.S. ENERGY RESEARCH DEVELOPMENT ADMIN.

PRIMARY FUNDING AMOUNT:

1973 - 263,000
1974 - 379,000
1975 - 550,000

TIME FRAME:

01 01 65 - CONTINUING

LOCATION:

ND

ABSTRACT:

DEVELOPMENT OF A WET SCRUBBING PROCESS FOR REMOVING SO(2) FROM STACK GASES USING ALKALI AVAILABLE IN COAL ASH AS THE SORBENT. DEMONSTRATION OF THE FEASIBILITY, IN TERMS OF HIGH SO(2) REMOVAL EFFICIENCY AND MINIMAL SCALING PROBLEMS, OF USING ASH-ALKALI SCRUBBING TO MEET FEDERAL SO(2) EMISSION REGULATIONS ON A NEW CYCLONE-FIRED UNIT BURNING NORTH DAKOTA LIGNITE. MEASUREMENT OF SO(2) ADSORPTION AND DESORPTION PROPERTIES OF WESTERN COAL CHAR, WESTERN FLY ASH AND NAHCOLITE (NAHCO 3))--A MINERAL ASSOCIATED WITH OIL SHALE--TO DETERMINE WHETHER THESE MATERIALS CAN BE USED IN EXISTING DRY PROCESSES FOR FLUE GAS DESULFERIZATION, OR FOR NO(X) ADSORPTION. DEVELOP RELIABLE MEANS FOR EVALUATING THE COLLECTABILITY OF HIGH-RESISTIVITY FLY ASH FROM LOW-SULFUR WESTERN COALS BY ELECTROSTATIC PRECIPITATION.

REPORTS AND PUBLICATIONS:

(1)G. H. GRONHOVD, P. H. TUFTE, ET AL. SOME STUDIES ON

STACK EMISSIONS FROM LIGNITE-FIRED POWERPLANTS. PREPRINT, MAY, 1973, 12 PP. (2)S. J. SELLE AND G. H. GRONHOVD. SOME COMPARISONS OF SIMULTANEOUS STACK GAS PARTICULATE DETERMINATIONS USING THE ASME & EPA METHODS. PRESENTED AT THE WINTER ANNUAL MEETING OF THE AMERICAN SOC. OF MECH. ENGR., NOV. 26-30, 1972, PREPRINT NO. 72-WA/APC-4, 5P. (3) E. A. SONDREAL AND P. H. TUFTE. COMPARISON OF FLUE GAS DESULFERIZATION FOR EASTERN VERSUS WESTERN U.S. COALS. PRESENTED AT THE 1974 FALL MEETING OF THE SOCIETY OF MINING ENGINEERS, AIME, SEPT. 1974, PREPRINT AVAILABLE. (4)E. A. SONDREAL, P. H. TUFTE, ET AL. WET SCRUBBING OF SO(2) WITH POLLUTION CONTROL. PREPRINT AVAILABLE. (5)P. H. TUFTE, E. A. SONDREAL, ET AL. PILOT PLANT SCRUBBER TESTS TO REMOVE SO(2) USING THE SOLUBLE ALKALI IN WESTERN COAL FLY ASH. PREPRINT, MAY 1973, 27 P.

00000214
PROJECT TITLE:
DRYING, STORAGE, AND HANDLING OF LOW-RANK WESTERN COALS
INVESTIGATORS:
G. GRONHOVD
RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
GRAND FORKS ENERGY RESEARCH CENTER
GRAND FORKS, ND 58201
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
1973 - 134,000
1974 - 100,000
1975 - 205,000
TIME FRAME:
01 01 71 - CONTINUING
LOCATION:
ND
ABSTRACT:
DEVELOPMENT OF PROCEDURES AND TREATMENTS TO ASSURE SAFE SHIPMENT, STORAGE, AND HANDLING OF DRIED LOW-RANK WESTERN COALS.
REPORTS AND PUBLICATIONS:
(1)J. W. A. BETZER. REVIEW OF THE USE OF PULSATING COMBUSTORS FOR DRYING & CONVEYING. PROCEEDINGS OF THE FIRST INTERNATIONAL SYMPOSIUM ON PULSATING COMBUSTION, 1971, SEPTEMBER 20-23, 1971, UNIVERSITY OF SHEFFIELD, SHEFFIELD, ENGLAND, EDITED BY D. J. BROWN. (2) A. M. COOLEY AND L. E. PAULSON, ET AL. DRYING OF LIGNITE IN A LOUVRE TYPE DRYER. PRESENTED AT MEETING OF NATIONAL INSTITUTE OF ENGINEERS (CANADA), UNIV. OF SASKATCHEWAN, SEPT.,1972. (3)L. E. PAULSON, S. A. COOLEY, ET AL. SHIPMENT, STORAGE & HANDLING CHARACTERISTICS OF DRIED LOW-RANK COALS. PREPRINT, MAY 1973, 16 PP. PRESENTED AT THE 1973 LIGNITE SYMPOSIUM, MAY 9-10, 1973, GRAND FORKS, ND. (4)E. A. SONDREAL AND R. C. ELLMAN. LABORATORY DETERMINATION OF FACTORS AFFECTING STORAGE OF NORTH DAKOTA LIGNITE: COMPUTER SIMULATION OF SPONTANEOUS HEATING. BUMINES RI 7887, 1974, 83 PP.

00000215
PROJECT TITLE:
UNDERGROUND GASIFICATION OF COAL
INVESTIGATORS:
L. A. SCHRIDER; C. F. BRANDENBURG; G. G. CAMPBELL
RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
LARAMIE ENERGY RESEARCH CENTER
LARAMIE, WY 82071
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
1973 - 325,000
1974 - 686,000
1975 - 1,000,000
TIME FRAME:
07 01 72 TO 07 01 82
LOCATION:
WY
ABSTRACT:
TO EVALUATE THE TECHNICAL, ECONOMIC, AND ENVIRONMENTAL PARAMETERS INVOLVED IN SUCCESSFUL UNDERGROUND GASIFICATION OF A WESTERN SUBBITUMINOUS COAL. THE SCALE OF THE PROPOSED WORK WILL PROVIDE DATA USEFUL IN DESIGNING A SMALL DEMONSTRATION PLANT TO FULLY DETERMINE FEASIBILITY OF THIS TECHNOLOGY AS A VIABLE COMMERCIAL SYSTEM TO SUPPLEMENT GAS SUPPLIES. THIS NECESSITATES OPERATION OF A COMPLETE SYSTEM TO PROVIDE USEFUL INFORMATION CONCERNING OPERATION PARAMETERS, ECONOMIC ADVANTAGES OR DISADVANTAGES, AND ENVIRONMENTAL CONSEQUENCES. THE LOW BTU GAS PRODUCED COULD BE USED FOR ON-SITE POWER PIPELINE QUALITY GAS, OR APPLIED TO IN-PLANT USE FOR SYNTHESIS OF SUCH COMMODITIES AS AMMONIA OR METHANOL OR FOR IN-PLANT HEATING OR POWER PRODUCTION REQUIREMENTS.
REPORTS AND PUBLICATIONS:
(1)L. A SCHRIDER AND J. PASINI III. UNDERGROUND GASIFICATION OF COAL-PILOT TEST, HANNA, WYOMING. PRES. AT AMERICAN GAS ASSOCIATION FIFTH SYNTHETIC PIPELINE GAS SYMPOSIUM, CHICAGO, IL., OCT. 29-31, 1973; (2)L. A. SCHRIDER AND J. PASINI. PRELIMINARY RESULTS RELEASED FOR WYOMING IN SITU GASIFICATION TEST. COAL AGE, DECEMBER 1973, PP. 58-61. (3)L. A. SCHRIDER, J. W. JENNINGS ET AL. AN UNDERGROUND COAL GASIFICATION EXPERIMENT, HANNA, WYOMING. SPE 4993, PRESENTED AT THE SPE FALL MEETING OF AIME, HOUSTON, TX., OCT. 6-9, 1974, 25 PP.; (4)G. G. CAMPBELL, C. F. BRANDENBURG, ET AL. PRELIMINARY EVALUATION OF UNDERGROUND COAL GASIFICATION AT HANNA, WYOMING. BUREAU OF MINES, TPR 82, OCT. 1972, 14 PP.

00000216
PROJECT TITLE:
PREMIUM FUELS FROM NORTHERN GREAT PLAINS LIGNITE: PROJECT LIGNITE
INVESTIGATORS:
D. E. SEVERSON
RESEARCH FACILITY:
UNIV. OF NORTH DAKOTA
ENG. EXPERIMENT STATION
GRAND FORKS, ND 58202
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
1973 - 208,000
1974 - 691,000
1975 - 1,075,000
LIGNITE
TIME FRAME:
07 01 65 TO 03 28 77
LOCATION:
ND
ABSTRACT:

PROJECT LIGNITE WAS INITIATED AT THE CHEMICAL ENGINEERING DEPARTMENT OF THE UNIVERSITY OF NORTH DAKOTA IN 1972 TO DEVELOP AN APPROACH TO THE CONVERSION OF LIGNITE IN A REFINERY PRODUCING A SPECTRUM OF UPGRADED PRODUCTS. THE OCR CONTRACT PROVIDED THAT DRYING, LIQUEFACTION, GASIFICATION, HYDROGENATION, AND CARBONIZATION OF LIGNITE WERE TO BE COMBINED IN A WAY THAT WOULD PERMIT FLEXIBILITY OF PRODUCT OUTPUT AND OPTIMIZATION OF PLANT ECONOMY. STEPS IN PROCESSING WERE TO BE IDENTIFIED THAT WERE IN NEED OF TECHNICAL ADVANCEMENT; AND LABORATORY, BENCH SCALE, AND PROCESS DEVELOPMENT WORK WERE TO BE CARRIED OUT ON SUCH STEPS TO PROVIDE INFORMATION NECESSARY FOR SCALEUP TO PILOT PLANT OPERATION. THE FIRST PROCESS STEP CHOSEN FOR STUDY WAS THE PRODUCTION OF SOLVENT REFINED LIGNITE (SRL) BY A MILD HYDROGENATION USING SYNTHESIS GAS AND A LIGNITE-DERIVED HYDROGEN DONOR SOLVENT CARRIER. THIS PROCESS HAD BEEN UNDER STUDY THROUGH SPONSORSHIP FIRST BY THE BURLINGTON NORTHERN RAILROAD AND THEN BY THE PITTSBURGH AND MIDWAY COAL MINING COMPANY AT UND FOR SEVERAL YEARS PRIOR TO COMMENCEMENT OF THE OCR PROGRAM, AND UNDER THE OCR IT HAS BEEN CARRIED THROUGH THE CONSTRUCTION OF A PROCESS DEVELOPMENT UNIT (PDU) SCALED FOR CONVERTING ABOUT 0.5 TONS PER DAY OF LIGNITE. THE PROCESS CONVERTS ABOUT 90 PERCENT OF THE MOISTURE-AND-ASH-FREE LIGNITE, YIELDING A PROJECTED 54 PER CENT OF SRL AND 9 PER CENT OF LIGHTER OILS.

REPORTS AND PUBLICATIONS:

(1)D. R. SKIDMORE, D. S. GLEASON, ET AL. LOW-ASH ELECTRODE CARBON FROM LIGNITE. BUREAU OF MINES CIRCULAR IC 8376 TECHNOLOGY AND USE OF LIGNITE, PROCEEDINGS: BUREAU OF MINES-UNIVERSITY OF NORTH DAKOTA SYMPOSIUM, GRAND FORKS, NORTH DAKOTA, APRIL 27-28, 1967, PP. 137-144; (2)D. E. SEVERSON, D. R. SKIDMORE, ET AL. SOLUTION-HYDROGENATION OF LIGNITE IN COAL-DRIVED SOLVENTS. TRANSACTIONS, SOCIETY OF MINING ENGINEERS, AIME, VOL. 247, PP. 133-136 (JUNE, 1970); (3)C. H. WRIGHT AND D. E. SEVERSON. EXPERIMENTAL EVIDENCE FOR CATALYST ACTIVITY IN COAL MINERALS. PREPRINTS DIVISION OF FUEL CHEMISTRY, ACS, VOL. 16, NO. 2, PP. 68-92 (1972); (4)D. E. SEVERSON, A. M. SOUBY, ET AL. LABORATORY STUDIES ON SOLUTION-HYDROGENATION OF LIGNITE. TO BE PUBLISHED IN BUREAU OF MINES INFORMATION CIRCULAR, TECHNOLOGY AND USE OF LIGNITE, PROCEEDINGS: BUREAU OF MINES-UNIVERSITY OF NORTH DAKOTA SYMPOSIUM, GRAND FORKS, ND, MAY 9-10, 1973; (5)A. M. SOUBY, D. E. SEVERSON, ET AL. PROJECT LIGNITE: CONVENIENCE FUELS FROM NORTHERN GREAT PLAINS PROVINCE LIGNITE. TO BE PUBLISHED IN THE PROCEEDINGS OF THE NORTH DAKOTA ACADEMY OF SCIENCE.

00000217
PROJECT TITLE:
THE COAL AND OIL SHALE RESOURCE DEVELOPMENT SYSTEMS: AN INTERIM REPORT
INVESTIGATORS:
I. L WHITE; M. A. CHARTOCK; R. L. LEONARD
RESEARCH FACILITY:
UNIVERSITY OF OKLAHOMA
SCIENCE 8 PUBLIC POLICY PROGRAM
NORMAN, OK 73069
PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION
PRIMARY FUNDING AMOUNT:
1974 - 35,000
TIME FRAME:
06 01 74 TO 04 01 75
LOCATION:
OK PA WY SD AZ CO
ABSTRACT:

THERE IS CURRENTLY UNDERWAY AN EFFORT TO MAKE COAL A MORE ATTRACTIVE, LESS ENVIRONMENTALLY THREATENING ENERGY SOURCE, PRIMARILY THROUGH THE DEVELOPMENT OF NEW TECHNOLOGIES WHICH DESULFURIZE IT OR CONVERT IT INTO A LIQUID OR GASEOUS FUEL. OIL SHALE AS AN ENERGY SOURCE IS STILL IN A VERY EARLY STAGE OF DEVELOPMENT, BUT HAS POTENTIAL AS AN IMPORTANT FUTURE SOURCE OF ENERGY. RESEARCH FOR THIS REPORT WAS DONE BY AN INTERDISCIPLINARY TEAM FOR THE PURPOSE OF GAINING BACKGROUND INFORMATION NEEDED FOR PLANNING A DETAILED TECHNOLOGY ASSESSMENT OF ONE OF THESE RESOURCE SYSTEMS. COAL WAS CHOSEN AS THE AREA FOR A MORE DETAILED STUDY ON THE BASIS OF THESE THREE CRITERIA: LIKELY PUBLIC POLICY SIGNIFICANCE OF THE RESOURCE AND ITS DEVELOPMENT IN THE RELATIVELY NEAR FUTURE; AVAILABILITY OF CLEAR-CUT TECHNOLOGICAL ALTERNATIVES; ACCESSIBILITY OF

DATA CONCERNING THESE ALTERNATIVES. DESCRIPTIONS OF THE RESOURCE BASE, THE DEVELOPMENT TECHNOLOGIES AVAILABLE NOW OR LIKELY TO BE AVAILABLE WITHIN TEN YEARS, ECONOMICS OF RESOURCE DEVELOPMENT, AND REGULATION OF RESOURCE DEVELOPMENT ARE GIVEN FOR BOTH THE COAL AND OIL SHALE SYSTEMS.

REPORTS AND PUBLICATIONS:
I. L. WHITE, M. A. CHARTOCK, ET AL. 'THE COAL AND OIL SHALE RESOURCE DEVELOPMENT SYSTEMS: AN INTERIM REPORT.' NORMAN, OKLA.: UNIVERSITY OF OKLAHOMA PRESS, 1975.

00000218

PROJECT TITLE:
COAL GASIFICATION: LIGNITE GASIFICATION PILOT PLANT

RESEARCH FACILITY:
U.S. ERDA, OFFICE OF COAL RESEARCH
18TH & C STREETS N. W.
WASHINGTON, DC 20240

PRIMARY SPONSOR:
U.S. ERDA, OFFICE OF COAL RESEARCH
CONSOLIDATION COAL CO.

PRIMARY FUNDING AMOUNT:
1971 - 3,000,000
1972 - 5,760,000

TIME FRAME:
06 01 64 TO 12 31 75

LOCATION:
DC SD

ABSTRACT:
CONSTRUCTION OF THE PILOT PLANT AT RAPID CITY, SOUTH DAKOTA, BEGAN IN AUGUST 1969. THIS PROCESS IS DESIGNED TO USE LIGNITE AS A RAW MATERIAL FOR CONVERSION TO PIPE-LINE-QUALITY GAS. THE PRINCIPAL FEATURE OF THE PROCESS IS THAT IT DOES NOT REQUIRE A LARGE AMOUNT OF OXYGEN. DOLOMITE (LIMESTONE) IS USED TO ABSORB CO 2 AND AS A HEAT-TRANSFER MEDIUM.

REPORTS AND PUBLICATIONS:
SEE OCR ANNUAL REPORT, APPENDIX

00000219

PROJECT TITLE:
IMPROVING THE THERMAL EFFICIENCY AND AVAILABILITY OF BOILERS BURNING WESTERN COALS AND LIGNITES - ADVANCING ENERGY UTILIZATION TECHNOLOGY - PROJECT G-1

INVESTIGATORS:
G. H. GRONHOVD

RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
GRAND FORKS ENERGY RESEARCH LAB
BOX 8213, UNIVERSITY STATION
GRAND FORKS, ND 58201

PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.

PRIMARY FUNDING AMOUNT:
PROPRIETARY

TIME FRAME:
07 01 73 TO INDEFINITE

LOCATION:
ND

ABSTRACT:
THE OBJECTIVE OF THIS RESEARCH PROJECT IS TO IMPROVE THE THERMAL EFFICIENCY AND INCREASE THE AVAILABILITY OF STEAM GENERATORS IN WESTERN POWERPLANTS. A STUDY WILL BE MADE OF FOULING AND CORROSION OF FIRESIDE HEAT-TRANSFER SURFACES TO DEFINE THE MECHANISM OF ASH DEPOSITION AND TO PURSUE FIELD RESEARCH IN ACTUAL INDUSTRIAL BOILERS. A SURVEY WILL ALSO BE UNDERTAKEN OF FUEL AND ASH PROPERTIES. THE PHENOMENA OF HEAT ABSORPTION IN LABORATORY AND COMMERCIAL BOILERS WILL ALSO BE STUDIED. DATA ON COMBUSTIBILITY OF LIGNITES, WESTERN COALS AND PROCESS CHARS WILL ALSO BE COLLECTED.

00000220

PROJECT TITLE:
STATISTICAL CLASSIFICATION AND ESTIMATION APPLIED TO GEOPHYSICAL INDUCTION SIGNATURES

PROJECT SUPERVISOR:
EDMUND A. QUINCY
UNIV. OF WYOMING, DEPT. OF ELECTRICAL ENGINEERING
LARAMIE, WY 82071
307-766-2162

PRIMARY SPONSOR:
UNIV. OF WYOMING
LARAMIE, WY 82071

TIME FRAME:
09 01 73 TO INDEFINITE

LOCATION:
WY

ABSTRACT:
THE BAYES ALGORITHM FOR CLASSIFYING NOISY ELECTROMAGNETIC INDUCTION SIGNATURES IS DERIVED AND ITS PERFORMANCE IS CALCULATED. TWO CLASSES OF NOISY GEOPHYSICAL RESPONSES ARE CONSIDERED. THE FIRST CLASS

CORRESPONDS TO A CONDUCTING HALF-SPACE WITH UNKNOWN CONDUCTIVITY AND THE SECOND CLASS CORRESPONDS TO A HORIZONTAL, THIN SHEET WITH UNKNOWN CONDUCTIVITY-THICKNESS PRODUCT.

IN ADDITION, THE CONDITIONAL MAXIMUM-LIKELIHOOD ALGORITHM FOR ESTIMATING THE CONDUCTIVITY-THICKNESS FROM NOISY CLASSIFIED RESPONSES IS DERIVED AND ITS PERFORMANCE CALCULATED. MEAN SQUARE ERROR FOR THIS ESTIMATOR IS COMPARED WITH THAT OBTAINED BY THE LINEAR INVERSE TECHNIQUE OF MODEL FITTING.

REPORTS AND PUBLICATIONS:
E. A. QUINCY AND D. F. MORRE. "BAYES CLASSIFICATION OF GEOPHYSICAL INDUCTION SIGNATURES AND MAXIMUM LIKELIHOOD ESTIMATION OF GEOPHYSICAL PARAMETERS." OCTOVER 1974, SUMMARY 1974 IEEE INTERNATIONAL SYMPOSIUM ON INFORMATION THEORY, NOTRE DAME, INDIANA.

00000221
PROJECT TITLE:
RHEOLOGY OF COAL-FUEL OIL SLURRIES
PROJECT NUMBER:
NSF EPP-750-4172
PROJECT SUPERVISOR:
LARRY G. BAUER
CHEMICAL ENG. DEPT.
SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY
RAPID CITY, SD 57701
605-394-2421
PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION
LEO SCIUCHETTI
UNDERGRADUATE RESEARCH PARTICIPANT
PROGRAM MGR./ROOM 636W
WASHINGTON, DC 20550
202-282-7900
PRIMARY FUNDING AMOUNT:
14,100
TIME FRAME:
01 20 75 TO 06 01 76
LOCATION:
SD
ABSTRACT:

THE SCIENTIFIC OBJECTIVE OF THIS PROPOSED PROJECT - THE DETERMINATION OF THE RHEOLOGICAL BEHAVIOR OF COAL-FUEL SLURRIES - WILL HAVE APPLICATION IN THE DESIGN AND OPERATION OF COAL LIQUIFACTION PLANTS.

00000222
PROJECT TITLE:
WASTE MONITORING AT THE RAPID CITY GASIFICATION PILOT PLANT
INVESTIGATORS:
RONALD J. SCHMITZ; J. H. JONTE; C. L. GRUBER
PROJECT SUPERVISOR:
JACK A. REDDEN
ENGINEERING AND MINING EXPERIMENT STATION
SOUTH DAKOTA SCHOOL OF MINES AND TECHNOLOGY
RAPID CITY, SD 57701
605-394-2496
COOPERATOR/COORDINATOR:
CONSOLIDATION COAL COMPANY
LIBRARY, PA 15129
PRIMARY SPONSOR:
U.S. ERDA
OFFICE OF COAL RESEARCH
WASHINGTON, DC
PRIMARY FUNDING AMOUNT:
35,000
TIME FRAME:
07 15 71 TO 06 30 76
LOCATION:
SD
ABSTRACT:

AT THE PRESENT TIME, THE RESEARCH UNDER THIS PORTION OF THE CONSOL SUBCONTRACT WITH SDSMT INCLUDES POND WASTE WATER MONITORING AS WELL AS A PROGRAM FOR SAMPLING OF EFFLUENT STREAMS WITHIN THE RAPID CITY PILOT PLANT. THE PH AND DISSOLVED OXYGEN AT THE WASTE WATER POND OUTLET IS MONITORED CONTINOUSLY AND IS SAMPLED PERIODICALLY FOR COMPLETE CHEMICAL ANALYSIS. THE OUTLET FROM THE POND IS ALSO MONITORED FOR WATER FLOW RATE, AVERAGE VALUE FOR SUSPENDED SOLIDS IN THE WATER, AND THE BIOCHEMICAL OXYGEN DEMAND OF THE WATER BEING DISCHARGED. THE SAMPLING OF EFFLUENT STREAMS WITHIN THE PLANT ARE HAVING A COMPLETE ANALYSIS OF THE WATER IN ORDER TO OBTAIN QUALITATIVE AS WELL AS QUANTITATIVE DATA WHICH WOULD BE USED IN THE DESIGN OF THE COMMERCIAL CONCEPT OF THE CO2 ACCEPTOR PROCESS.

REPORTS AND PUBLICATIONS:
INTERIM REPORT: WASTE MONITORING AT THE CO2 GASIFICATION PILOT PLANT, RAPID CITY, SD PREPARED FOR CONSOLIDATION COAL COMPANY, RE: CONSOL CO2 ACCEPTOR PROCESS OCR, PRIME CONTRACT NUMBER 14-01-0001-415(3).

1.7 MINING AND EXTRACTION METHODOLOGY

00000223
PROJECT TITLE:
FOREST ENGINEERING SYSTEMS FOR STEEP MOUNTAIN FORESTRY
INVESTIGATORS:
R. B. GARDNER
RESEARCH FACILITY:
U.S. FOREST SERVICE, FORESTRY SCIENCES LAB.
BOZEMAN, MT 59715
PRIMARY SPONSOR:
U.S. FOREST SERVICE
PRIMARY FUNDING AMOUNT:
1973 - 90,000
1974 - 90,000
1975 - 90,000
TIME FRAME:
01 01 73 - CONTINUING
LOCATION:
MT
ABSTRACT:

MOST SURFACE MINED MATERIAL IS HAULED IN LARGE TRUCKS; CONSEQUENTLY, ELABORATE--THOUGH POORLY PLANNED--ROAD SYSTEMS ARE BUILT TO SERVICE SURFACE MINED AREAS. A STUDY IS BEING DONE TO DEVELOP TRANSPORT SYSTEMS TO REDUCE THE ENVIRONMENTAL IMPACT ON FOREST ROADS. AN EXPERIMENTAL ROAD WAS DESIGNED AND CONSTRUCTED ON THE CORAM EXPERIMENTAL FOREST IN THE FLATHEAD NATIONAL FOREST IN NORTHWESTERN MONTANA. SEVERAL YEARS OF MONITORING OF ENVIRONMENTAL IMPACTS WILL BE NECESSARY BEFORE THEY CAN BE EVALUATED AND THESE EVALUATIONS WILL BE REPORTED IN FUTURE PUBLICATIONS.

00000224

PROJECT TITLE:
DEVELOPMENT OF PREMINING AND RECLAMATION PLAN RATIONALE

PROJECT NUMBER:
J0255002

INVESTIGATORS:
LLOYD BROWN : GERALD PLACE
605 PARFET ST.
DENVER, CO 80215
303-232-6262

PROJECT SUPERVISOR:
AL D. PERNICHELE
DAMES & MOORE
7101 WISCONSIN AVE.
WASHINGTON, DC 20014
301-652-2215

PRIMARY SPONSOR:
U.S. BUREAU OF MINES
SPOKANE MINING RESEARCH CENTER
LEWIS M MCNAY
E. 314 MONTGOMERY
SPOKANE, WA 00297
509-484-1610

PRIMARY FUNDING AMOUNT:
FY 76 - 92,313
FY 77 - 240,000
FY 78 - 200,045

TIME FRAME:
06 24 75 TO 06 24 78

ABSTRACT:

EXISTING AND PROPOSED STATE AND FEDERAL SURFACE MINING AND RECLAMATION STATUTES CONTAIN PERMIT PROGRAMS WHICH CONTAIN PERMIT PROGRAMS WHICH REQUIRE MINE OPERATORS TO DEVELOP AND PREPARE COMPREHENSIVE PREMINING AND RECLAMATION PLANS. TO COMPLY WITH THIS REQUIREMENT, A PREMINING INVESTIGATION MUST FIRST BE CONDUCTED TO DEFINE EXISTING CLIMATIC, GEOLOGIC, HYDROLOGIC, PHYSIOGRAPHIC, LOCAL AND REGIONAL LAND-USE PATTERNS AND PLANS, AND SOCIO-ECONOMIC CONDITIONS AT THE PROPOSED MINESITE.

SECONDLY, THE PLAN MUST DISCUSS TEMPORARY DISTURBANCE TO THESE ABOVE-MENTIONED PARAMETERS AND THE METHODOLOGY THE OPERATOR WILL EMPLOY TO CONTROL ANY ADVERSE IMPACT TO THE ENVIRONMENT DURING AND FOLLOWING MINING ACTIVITY.

CONTRACT OBJECTIVE: TO DEVELOP A LOGICAL RATIONALE FOR PREPARING PREMINING AND RECLAMATION PLANS AND TO FIELD TEST AND EVALUATE THE DEVELOPED RATIONALE. THE CONTRACTOR SHALL CONDUCT THE PROPOSED RESEARCH STUDY IN THREE DISTINCT PHASES:

PHASE I SHALL BE DIRECTED TOWARE THE DEVELOPMENT OF LOGICAL RATIONALE PROCEDURES, AND GUIDELINES TO DEVELOPMENT PREMINING AND RECLAMATION PLANS:

PHASE II EFFORT SHALL CONSIST OF DEVELOPING METHODOLOGY AND SELECTING EQUIPMENT TO EVALUATE PREMINING SITE CONDITIONS; AND

PHASE III SHALL CONSIST OF DEVELOPING METHODOLOGY AND SELECTING EQUIPMENT TO EVALUATE PREMINING SITE

PHASE III SHALL CONSIST OF A SERIES OF FIELD TEST TO EVALUATE THE VIABILITY OF THE DEVELOPED RATIONALE AND TO DELINEATE APPROPRIATE MODIFICATIONS TO IMPROVE THE UTILITY OF THE RATIONALE.

TYPE OF STUDY:
PART OF "SURFACE MINING, EXTRACTION, RECLAMATION SUBPROGRAM." U.S. BUREAU OF MINES, SPOKANE MINING RESEARCH CENTER.

00000225

PROJECT TITLE:
ALTERNATE METHODS OF HANDLING THE PARTING BETWEEN TWO COAL SEAMS

PROJECT NUMBER:
G0254004

INVESTIGATORS:
THOMAS E. FINCH

PROJECT SUPERVISOR:
MONTANA COLLEGE OF MINERAL SCIENCE & TECHNOLOGY FOUNDATION
WEST PARK STREET
BUTTE,MONTANA 59701
406-792-8321

PRIMARY SPONSOR:
U.S. BUREAU OF MINES, SPOKANE MINING RESEARCH CENTER
THOMAS W. MARTIN
E. 315 MONTGOMERY
SPOKANE, WA 99207
509-484-1618

COOPERATOR:
WESTERN ENERGY CO.
40 E. BROADWAY
BUTTE, MT 59701

PRIMARY FUNDING AMOUNT:
21,772

TIME FRAME:
08 11 74 TO 08 11 75

LOCATION:
MT

ABSTRACT:
AN EXAMINATION OF THE ALTERNATE METHODS OF HANDLING THE PARTING BETWEEN TWO COAL SEAMS. AN EXISTING MINE WILL BE STUDIES USING INDUSTRIAL ENGINEERING TECHNIQUES TO DETERMINE ALL DESING AND EQUIPMENT INTERACTIONS. THE ECONOMIC AND TECHNICAL FEASIBILITY OF A STORING METHOD WILL BE COMPARED WITH THE PRESENT PRACTICE OF SPOIL HANDLING.

TYPE OF STUDY:
PART OF "SURFACE MINING, EXTRACTION, RECLAMATION SUBPROGRAM," U.S. BUREAU OF MINES, SPOKANE MINING RESEARCH CENTER.

00000226

PROJECT TITLE:
CONTINUOUS STRIPPING AND MINING TECHNIQUE

PROJECT NUMBER:
H0252057

INVESTIGATORS:
F. H. HOLLAND

PROJECT SUPERVISOR:
HOLLAND CONSTRUCTION CO.
P.O. BOX 20223
BILLINGS, MT 59102
406-656-2506

COOPERATOR:
WYODAK MINE
BUD WESTRE
GILLETTE, WY 82616

PRIMARY SPONSOR:
U.S. BUREAU OF MINES
SPOKANE MINING RESEARCH CENTER
EARL FRIZZELL
E. 315 MONTGOMERY
SPOKANE, WA 99207

SECONDARY SPONSOR:
HOLLAND CONSTRUCTION CO.

PRIMARY FUNDING AMOUNT:
264,558

SECONDARY FUNDING AMOUNT:
211,508

TIME FRAME:
06 27 75 TO 12 27 75

LOCATION:
WY

ABSTRACT:
OBJECTIVES: TO DETERMINE BY FIELD TESTS WHETHER THE CONTINUOUS/EXCAVATOR LEADER WILL MAINTAIN OR INCREASE PRODUCTION IN THE NORTHERN GREAT PLAINS REGION AT A LOWER COST. TO PROCURE OPERATING DATA FOR ASSESSING THE EQUIPMENT'S POTENTIAL AS A COAL-MINING MACHINE.

TYPE OF STUDY:
PART OF "SURFACE MINING EQUIPMENT SUB-PROGRAM," U.S. BUREAU OF MINES. SPOKANE MINING RESEARCH CENTER

00000227
PROJECT TITLE:
EVALUATION OF ALTERNATIVE TRANSPORTATION AND EARTH PLACEMENT SYSTEMS APPLICABLE TO SURFACE MINING SITES.
PROJECT SUPERVISOR:
ALFRED C. SCHEER; DONALD R. REICHMUTH
MONTANA STATE UNIV., DEPT. OF CIVIL ENG.
BOZEMAN, MT 59715
406-994-2111
PRIMARY SPONSOR:
U.S. FOREST SERVICE, SURFACE ENVIRONMENT & MINING
145 GRAND AVE.
BILLINGS, MT
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
115,000
TIME FRAME:
06 15 74 TO 06 30 76
LOCATION:
MT
ABSTRACT:
IN THE TRANSPORTATION PHASE, THE BASIC OBJECTIVE IS TO DEVELOP A METHODOLOGY FOR ASSESSING THE ENVIRONMENTAL IMPACTS OF ALTERNATIVE TRANSPORTATION SYSTEMS DESIGNED TO SERVICE SURFACE MINING OR EXPLORATION SITES.
IN THE EARTH PLACEMENT PHASE, THE BASIC OBJECTIVE IS TO DEVELOP A METHODOLOGY FOR ASSESSING AND COMPARING ALTERNATIVE SURFACE MINING EARTH PLACEMENT STRATEGIES RELATIVE TO THEIR ENVIRONMENTAL IMPACTS WITH PARTICULAR EMPHASIS ON MASS STABILITY AND RECLAMATION VIABILITY.

0000228
PROJECT TITLE:
GEOSTATISTICS OF WYOMING COAL
INVESTIGATORS:
GARY GLASS
WYOMING GEOLOGICAL SURVEY
LARAMIE, WY
307-766-2287
PROJECT SUPERVISOR:
LEON E. BORGMAN
UNIV. OF WYOMING, DEPT. OF GEOLOGY
UNIVERSITY STATION
LARAMIE, WY. 82071
307-766-6148
PRIMARY SPONSOR:
U.S. BUREAU OF LAND MANAGEMENT
SECONDARY SPONSORS:
UNIV. OF WYOMING
PRIMARY FUNDING AMOUNT:
14,000
SECONDARY FUNDING AMOUNTS:
10,397
LOCATION:
WY
ABSTRACT:

A DETAILED STATISTICAL ANALYSIS OF THE CHEMICAL, PHYSICAL, AND GEOLOGICAL CHARACTERISTIC OF WYOMING COALS IS PROPOSED. TECHNIQUES OF GEOSTATISTICS WILL BE USED TO CHARACTERIZE SPATIAL AND IN SITU VARIABILITY OF AVAILABLE AND FORTHCOMING DATA FOR WYOMING COALS. THE PROJECT WILL TRY TO 'MAKE SENSE' OUT OF THE MAZE OF COAL DATA AND REDUCE THE DATA TO THE LEAST NUMBER OF STATISTICAL CHARACTERIZATIONS AND RELATIONSHIPS POSSIBLE. DATA CONSIDERED FOR ANALYSIS WILL INCLUDE PROXIMATE, ULTIMATE AND HEATING VALUE, ASH CONTENT, ASH FUSION TEMPERATURES, GRINDABILITY INDICES, SULFUR CONCENTRATIONS, AND TRACE ELEMENTS. THE PROJECT WILL SERVE AS A LOGICAL NEXT STEP IN THE STUDY OF THIS DATA AS OBTAINED TO MAKE THE INFORMATION AS USEFUL TO GOVERNMENT AND INDUSTRIAL PLANNING AS POSSIBLE.

FOR PRELIMINARY SCREENING, STANDARD STATISTICAL PROCEDURES SUCH AS ANALYSIS OF VARIANCE, REGRESSION, AND ANALYSIS OF COVARIANCE WILL BE USED. MULTIVARIATE VERSIONS OF THESE PROCEDURES WILL PROBABLY PROVE USEFUL.

A MAJOR EFFORT WILL BE MADE TO UTILIZE THE GEOSTATISTICAL THEORY OF REGIONALIZED VARIABLES AS DEVELOPED BY MATHERON AND HIS STUDENTS IN FRANCE.

REPORTS AND PUBLICATIONS:

BORGMAN, L.E., 'CORRELATED RANDOMNESS: A CENTRAL PROBLEM IN ESTIMATING RELIABILITY OF ORE-BODY EVALUATION,' DECISION-MAKING IN THE MINERAL INDUSTRIES,IV, CENTRE FOR CONTINUED EDUCATION, UNIV. OF BRITISH COLUMBIA, VANCOURER, B.C., 1971.

GLASS, G.B., D.W. LANE AND F.K. ROOT, 'SWEETWATER COUNTY, WYOMING: GEOLOGIC MAP,ATLAS AND SUMMARY OF ECONOMIC MINERAL RESOURCES' 'WYOMING GEOL. SURVEY COUNTY RESOURCE SERIES CRS-2, 9 PLATES, 1973.

0000229
PROJECT TITLE:
GEOCHEMICAL SURVEY OF THE WESTERN COAL REGIONS
INVESTIGATORS:
R. J. EBENS; J. M. MCNEAL, G. L. FEDER; R. R. TIDBALL;
R. C. SEVERSON; J. A. ERDMAN; L. P. GOUGH; B. M. ANDERSON
PROJECT SUPERVISOR:
JON J. CONNOR
U.S. GEOLOGICAL SURVEY
DENVER FEDERAL CENTER
LAKEWOOD, CO 80225
303-234-3715
PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
LOCATION:
MT ND WY
ABSTRACT:

THE OBJECTIVE OF THE PROGRAM IS TO MAKE A RECONNAISSANCE GEOCHEMICAL SURVEY OF THE AREA OF THE COAL-BEARING IN THE ROCKY MOUNTAINS AND NORTHERN GREAT PLAINS. THE SURVEY WILL EMPHASIZE THE GEOCHEMISTRY OF THE ROCKS (RATHER THAN THE COALS), THE SOILS AND VEGETATION WHICH OVERLIE THESE ROCKS, AND THE WATER CONTAINED IN THE ROCKS AND IN STREAMS DRAINING SUBSTANTIAL PARTS OF THE AREAS UNDERLAIN BY THESE ROCKS. THE SURVEY WILL ATTEMPT TO PROVIDE GEOCHEMICAL BACKGROUND SUMMARIES AGAINST WHICH FUTURE CHANGES IN THE GEOCHEMICAL ENVIRONMENT IN OR ADJACENT TO DEVELOPED AREAS, INCLUDING COLSTRIP, MONTANA, MAY BE REALISTICALLY MEASURED.

REPORTS AND PUBLICATIONS:

GEOCHEMICAL SURVEY OF THE WESTERN COAL REGIONS, FIRST ANNUAL PROGRESS REPORT: U.S. GEOL. SURVEY, OPEN-FILE REPORT NO. 74-250, 1974.

GEOCHEMICAL SURVEY OF THE WESTERN COAL REGIONS, SECOND ANNUAL PROGRESS REPORT: U.S. GEOL. SURVEY, OPEN-FILE REPORT, 1975.

CONNOR, J. J., KEITH, J. R., AND ANDERSON, B. M. TRACE METAL VARIATION IN SOILS AND SAGEBRUSH IN THE POWDER RIVER BASIN, WYOMING AND MONTANA: U.S. GEOL. SURVEY, JOURNAL OF RESEARCH, V. 4, N. 1, 1976.

00000230
PROJECT TITLE:
DEVELOPMENT AND FIELD TESTING OF METHODS FOR IN SITU OIL RECOVERY FROM TARS AND DEPOSITS
INVESTIGATORS:
C. Q. CUPPS; C. S. LAND; L. C. MARCHANT
RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
LARAMIE ENERGY RESEARCH CENTER
LARAMIE, WY 82070
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
1973 - 222,000
1974 - 165,000
1975 - 842,000
TIME FRAME:
07 01 71 TO 06 01 77
LOCATION:
UT WY
ABSTRACT:
THIS RESEARCH HAS THE OBJECTIVE TO DEVELOP IN SITU METHODS APPLICABLE TO OIL RECOVERY FROM TAR SAND DEPOSITS WITHOUT EXCESSIVE ENVIRONMENTAL COST. IN SITU METHODS WILL BE REQUIRED, BECAUSE MOST OF THE 30 BILLION BARRELS OR MORE IN KNOWN U.S. TAR SAND DEPOSITS AS WELL AS THE HUGE RESOURCE IN ATHABASCA,CANADA OCCUR UNDER TOO THICK OVERBURDENS FOR ECONOMICAL STRIP MINING AND SURFACE EXTRACTION OF THE BITUMEN. BEGINNING IN FY 1972 A CONTINUING PROGRAM OF ANALYZING THE PHYSICAL PROPERTIES (POROSITY, PERMEABILITY, OIL AND WATER SATURATION, COMPRESSIVE STRENGTH) OF U.S. TAR SAND DEPOSITS WAS UNDERTAKEN.
IN FY 1973 LABORATORY INVESTIGATION OF THE REVERSE COMBUSTION PROCESS AS A TAR SAND OIL RECOVERY METHOD WAS BEGUN. IN FY 1974 PREPARATIONS WERE BEGUN TO CONDUCT FIELD EXPERIMENTS WITH THIS PROCESS TO RECOVER OIL FROM TAR SAND UNDER A 10-ACRE SITE IN THE NORTHWEST ASPHALT RIDGE DEPOSIT ABOUT 5 MILES WEST OF VERNAL, UTAH. THE FIRST OF ABOUT THREE SMALL-SCALE FIELD EXPERIMENTS SHOULD BEGIN ABOUT JUNE OR JULY 1975. THESE EXPERIMENTS, TO END ABOUT JUNE 1977, WILL DETERMINE THE TECHNICAL FEASIBILITY OF RECOVERING TAR SAND OIL WITH THE REVERSE COMBUSTION PROCESS AND THE SEVERITY OF PRODUCTION PROBLEMS ENCOUNTERED.
REPORTS AND PUBLICATIONS:
(1)L. C. MARCHANT, L. A. JOHNSON, ET AL. PROPERTIES OF UTAH TAR SANDS--THREE-MILE CANYON AREA, PR SPRING DEPOSIT. BUMINES, DEPT. OF INVEST. 7923, 1974, 14 PP. (2) L. A. JOHNSON, L. C. MARCHANT, ET AL. PROPERTIES OF UTAH TAR SANDS--SOUTH SEEP RIDGE AREA, PR SPRING DEPOSIT. PROPOSED BUMINES, DEPT. OF INVEST. SUBMITTED FOR PUBLICATION SEPT. 9,1974; (3)L. A. JOHNSON, L. C. MARCHANT, ET AL. PROPERTIES OF UTAH TAR SANDS--ASPHALT WASH AREA, PR SPRING DEPOSIT. PROPOSED BUMINES, DEPT. OF INVEST. SUBMITTED FOR PUBLICATION NOV. 14,1974; (4)L. C. MARCHANT, C. S. LAND, ET AL. EXPERIMENTAL APPROACH TO IN SITU OIL RECOVERY FROM U.S. TAR SANDS. FOR PRESENTATION TO ASME MEETING, ALBUQUERQUE NM, MARCH 7, 1975.

00000231
PROJECT TITLE:
PRODUCTION OF CLEAN FUELS FROM OIL SHALE
INVESTIGATORS:
P. L. COTTINGHAM; E. L. BURWELL; L. K. BARKER
RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
LARAMIE ENERGY RESEARCH CENTER
LARAMIE, WY 82070
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
1973 - 537,000
1974 - 577,000
1975 - 590,000
TIME FRAME:
07 01 63 TO 06 01 78
LOCATION:
WY
ABSTRACT:
THIS PROJECT IS DESIGNED TO INVESTIGATE MEANS OF EFFECTIVELY PRODUCING HIGH QUALITY OIL SHALE FUELS AND CHEMICAL BYPRODUCTS. SHALE OIL PRODUCTS PRODUCED UNDER DIFFERENT CONDITIONS AND FROM DIFFERENT PROCESSES ARE CHARACTERIZED AND REFINED USING SMALL PILOT-SCALE EQUIPMENT. TO A MAJOR DEGREE MODERN REFINING PROCESSES OF THE PETROLEUM INDUSTRY ARE EMPLOYED WITH MODIFICATIONS IN CONDITIONS AS MAY BE FOUND NECESSARY TO YIELD ACCEPTABLE RESULTS WITH SHALE OIL. INNOVATIVE TECHNIQUES SUCH AS CONTROLLED OXIDATION ALSO ARE INVESTIGATED TO A SMALLER EXTENT. THE RESULTS ARE CORRELATED WITH THE CHARACTERISTICS AND PRODUCT HISTORY OF THE CRUDE SHALE OIL UNDER CONSIDERATION. CURRENT EMPHASIS: THE CURRENT EMPHASIS IN THE REFINING PHASE OF THIS PROJECT IS ON THE REFINABILITY OF IN SITU CRUDE SHALE OIL, AND ON HYDROGASIFICATION OF IN SITU CRUDE SHALE OIL AND/OR ITS FRACTIONS TO PRODUCE PIPELINE QUALITY GAS. A STUDY ON GASIFICATION OF OIL SHALE TO PRODUCE A USEABLE LOW BTU GAS WAS INITIATED AND IS BEING PURSUED.
REPORTS AND PUBLICATIONS:
A COMPLETE LIST OF BUREAU OF MINES PUBLICATIONS CONCERNING OIL SHALE AND SHALE OIL RESEARCH, ALL OF WHICH ARE AVAILABLE TO THE PUBLIC, IS FOUND IN'A BIBLIOGRAPHY

OF OIL SHALE AND SHALE OIL PUBLICATIONS,' WHICH MAY BE OBTAINED FROM THE LARAMIE ENERGY RESEARCH CENTER. IT IS AN IN-HOUSE PUBLICATION HAVING A REFERENCE NUMBER OF OSRD-59.

00000232
PROJECT TITLE:
DEVELOP METHODS TO CHARACTERIZE HEAVY LIQUIDS FROM FOSSIL FUEL ENERGY SOURCES
INVESTIGATORS:
D. R. LATHAM
RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
LARAMIE ENERGY RESEARCH CENTER
LARAMIE, WY 82070
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
AMERICAN PETROLEUM INSTITUTE
PRIMARY FUNDING AMOUNT:
1973 - 86,000
1974 - 86,000
1975 - 100,000
TIME FRAME:
07 01 66 TO 06 01 78
LOCATION:
WY
ABSTRACT:
THE OBJECTIVES OF THIS PROJECT ARE: (1)DEVELOP SEPARATING METHODS TO PREPARE ANALYTICALLY SIGNIFICANT FRACTIONS FROM PETROLEUM RESIDUES, TAR SAND BITUMENS, AND LIQUIDS FROM COAL AND OIL SHALE; (2)DEVELOP TECHNIQUES TO CHARACTERIZE THE MAJOR COMPOUND TYPES IN EACH FRACTION; (3) DEVELOP INFORMATION ON THE COMPOUND TYPE RELATIONSHIPS AMONG THE FOSSIL FUEL ENERGY SOURCES; AND (4)APPLY THIS INFORMATION IN SOLVING THE PROBLEMS OF EFFICIENT UTILIZATION OF THESE MATERIALS AS AN ENERGY SOURCE. A SEPARATION-CHARACTERIZATION METHOD THAT WAS DEVELOPED FOR HIGH-BOILING PETROLEUM DISTILLATES WILL BE TESTED, MODIFIED AND APPLIED TO THE MATERIALS LISTED ABOVE. THE CHARACTERIZATION DATA OBTAINED ARE NEEDED IN PROCESSING AND UTILIZING THE MATERIALS AND IN EXPLORATION STUDIES.
REPORTS AND PUBLICATIONS:
(1)T. E. COGSWELL, J. F. MCKAY, ET AL. GEL PERMEATION CHROMATOGRAPHIC SEPARATION OF PETROLEUM ACIDS. ANAL. CHEM. 44, 1391 (1972); (2)D. M. JEWELL, J. H. WEBER, ET AL. ION EXCHANGE COORDINATION, AND ADSORPTION CHROMATOGRAPHIC SEPARATION OF HEAVY-END PETROLEUM DISTILLATES. ANAL. CHEM. 44, 1391 (1972); (3)J. F. MCKAY, D. M. JEWELL, ET AL. SEPARATION OF ACIDIC COMPOUND TYPES ISOLATED FROM HIGH-BOILING PETROLEUM DISTILLATES. SEPARATION SCI., 7 (4) 361 (1972); (4)J. F. MCKAY AND D. R. LATHAM. FLUORESCENCE SPECTROSCOPY IN THE CHARACTERIZATION OF HIGH-BOILING PETROLEUM DISTILLATES. ANAL. CHEM. 44, 2132 (1972); (5)J. F. MCKAY AND D. R. LATHAM. POLYAROMATIC HYDROCARBONS IN HIGH-BOILING PETROLEUM DISTILLATES. ISOLATION BY GEL PERMEATION CHROMATOGRAPHY AND IDENTIFICATION BY FLUORESCENCE SPECTROSCOPY. ANAL. CHEM. 45, 1050 (1973); (6)J. F. MCKAY, T. E. COGSWELL, ET AL. ANALYTICAL METHODS FOR THE ANALYSIS OF ACIDS IN HIGH-BOILING PETROLEUM DISTILLATES. PREPRINTS, DIV. PET. CHEM. 19 (1) 25, 1974

00000233
PROJECT TITLE:
CHARACTERISTICS AND EVALUATION OF OIL SHALE RESOURCES
INVESTIGATORS:
J. W. SMITH; W. ROBINSON
RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
LARAMIE ENERGY RESEARCH CENTER
LARAMIE, WY 82071
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
1973 - 502,000
1974 - 410,000
1975 - 510,000
TIME FRAME:
01 01 47 - CONTINUING
LOCATION:
WY
ABSTRACT:
THE MAJOR OBJECTIVE OF THIS PROJECT IS TO DETERMINE THE EXTENT AND NATURE OF DOMESTIC OIL SHALE HAVING REASONABLY NEAR-TERM INTEREST AS POTENTIAL SOURCES OF ENERGY. EMPHASIS IS ON OIL SHALE OF THE GREEN RIVER FORMATION OF COLORADO, UTAH AND WYOMING, ALTHOUGH SOME WORK IS ALSO DONE ON OTHER DOMESTIC SHALES SUCH AS THE NEW ALBANY SHALES OF KENTUCKY AND THE CHATTANOOGA SHALES OF TENNESSEE. OIL SHALE CORES AND OTHER TYPES OF SAMPLES ARE OBTAINED, IN SOME CASES DIRECTLY BY THE RESEARCH CENTER AND IN SOME INSTANCES FROM OTHER GOVERNMENT OR INDUSTRY SOURCES. THESE SAMPLES ARE ASSAYED TO DETERMINE THEIR OIL POTENTIAL, AND MANY ARE ALSO CHARACTERIZED IN REGARD TO ORGANIC CONTENT, NATURE AND REACTIONS OF ORGANIC MATTER, MINERAL CONSTITUENTS AND THERMAL BEHAVIOR. THE RESULTING DATA ARE USED TO EVALUATE PARTICULAR AREAS AS POTENTIAL SITES FOR COMMERCIALIZATION DEVELOPMENT, AND, BY CORRELATION, TO DEFINE SHALE QUALITY OVER BROAD STRATIGRAPHIC AND GEOGRAPHIC RANGES. CURRENT EMPHASIS IS ON SELECTING SITES FOR TESTING A MODIFIED IN SITU PROCESSING METHOD AND CHARACTERIZING THE OIL SHALE DEPOSIT ON THESE SITES.
REPORTS AND PUBLICATIONS:
COMPLETE BIBLIOGRAPHIC CITATIONS FOR THE MANY PUBLICATIONS

RESULTING FROM THIS PROJECT TO DATE CAN BE OBTAINED FROM CSRD 59, 'A BIBLIOGRAPHY OF BUREAU OF MINES PUBLICATIONS DEALING WITH OIL SHALE AND SHALE OIL, 1917-1974.' THIS BIBLIOGRAPHY IS AVAILABLE FROM THE LIBRARIAN AT THE LARAMIE ENERGY RESEARCH CENTER.

00000234

PROJECT TITLE:

THE CHEMISTRY OF TAR SAND BITUMENS

INVESTIGATORS:

S. M. DORRENCE

RESEARCH FACILITY:

U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
LARAMIE ENERGY RESEARCH CENTER
LARAMIE, WY 82070

PRIMARY SPONSOR:

U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.

PRIMARY FUNDING AMOUNT:

1973 - 125,000
1974 - 145,000
1975 - 200,000

TIME FRAME:

07 01 72 TO 06 01 77

LOCATION:

WY

ABSTRACT:

THIS PROJECT IS INVOLVED WITH DEVELOPMENT OF METHODS FOR CHEMICAL CHARACTERIZATION OF OILS, CHARS, GASES, AND WATER CONTAMINANTS PRODUCED DURING LABORATORY AND FIELD EXPERIMENTS DESIGNED TO DEVELOP IN SITU RECOVERY OF TAR SANDS. THE OILS ARE BEING CHARACTERIZED WITH SPECIAL EMPHASIS ON THEIR REFINABILITY AND FUEL VALUE. SOLVENT-EXTRACTED TAR SAND BITUMENS ARE BEING INVESTIGATED TO DETERMINE CHEMICAL COMPOSITION AND PHYSICAL PROPERTIES TO ESTABLISH HOW THESE PARAMETERS AFFECT RECOVERY, AND TO PROVIDE BASELINES TO EVALUATE THE EXTENT TO WHICH PRODUCED OILS ARE UPGRADED COMPARED TO ORIGINAL BITUMENS. GASES AND WATER-SOLUBLE MATERIALS PRODUCED DURING RECOVERY EXPERIMENTS ARE BEING ANALYZED TO ASSESS ENVIRONMENTAL IMPACT. WHEN IT IS NECESSARY, METHODS OF REMOVAL OF POTENTIALLY DETRIMENTAL MATERIALS WILL BE DEVELOPED.

REPORTS AND PUBLICATIONS:

J. W. BUNGER, PREPRINTS, DIV. OF FUEL CHEMISTRY, AMERICAN CHEM. SOC., V. 19 FEBRUARY, 1974, PP. 231-241.

00000235

PROJECT TITLE:

OIL AND GAS STIMULATION

INVESTIGATORS:

F. T. JOHANSEN; C. Q. CUPPS; J. PASINI; O. C. BAPTIST

RESEARCH FACILITY:

U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
BARTLESVILLE ENERGY RESEARCH CENTER
BARTLESVILLE, OK 74003

PRIMARY SPONSOR:

U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.

PRIMARY FUNDING AMOUNT:

1973 - 1,618,000
1974 - 4,718,000
1975 - 24,200,000

TIME FRAME:

01 01 74 TO 01 01 78

LOCATION:

OK WY WV CA

ABSTRACT:

THE PURPOSE OF THIS PROJECT IS TO PROVIDE THE ADVANCED TECHNOLOGY NEEDED TO SUBSTANTIALLY INCREASE THE EFFICIENCY OF RECOVERY OF PETROLEUM AND NATURAL GAS FROM KNOWN DEPOSITS AND TO DEVELOP RECOVERY METHODS FROM NEW SOURCES SUCH AS HEAVY OIL AND TAR SANDS. SOME OF THE METHODS THAT WILL BE TRIED ARE MICELLAR AND POLYMER FLOODING, IMPROVED WATER FLOODING, CARBON DIOXIDE INJECTION, MASSIVE HYDRAULIC FRACTURING, CHEMICAL-EXPLOSIVE FRACTURING, CYCLIC SOLVENT INJECTION AND IN SITU COMBUSTION. SEVERAL COST-SHARING CONTRACTS WITH INDUSTRY HAVE ALREADY BEEN INITIATED SINCE THE BEGINNING OF FISCAL YEAR 1975. REQUESTS FOR PROPOSALS ARE BEING ISSUED FOR OTHER CONTRACTS. OTHER LOCATIONS WHERE THIS WORK IS BEING DONE ARE LARAMIE ENERGY RESEARCH CENTER, MORGANTOWN ENERGY RESEARCH CENTER AND SAN FRANCISCO ENERGY RESEARCH CENTER.

REPORTS AND PUBLICATIONS:

1. G. L. GATES AND W. H. CARAWAY. SOLVENT STIMULATION VISCOUS CRUDE-OIL PRODUCTION. PRES. 42ND ANNUAL CALIFORNIA REG. MEETING, LOS ANGELES, CA., NOV. 4-5, 1971, SOC. PETROL ENG., AIME, SPE PREPRINT 3680, 11 P; 2. R. V. HIGGINS AND A. J. LEIGHTON. NUMERICAL METHODS FOR DETERMINING STREAMLINES AND ISOPRESSURES FOR USE IN FLUID-FLOW STUDIES. BUMINES RI 7621, 1972, 60 PP.; 3. PRESSURE DISTRIBUTION IN IRREGULARLY BOUNDED RESERVOIRS. BUMINES RI 7666, 1972, 15 PP.; 4. MATCHING CALCULATED WITH ACTUAL WATERFLOOD PERFORMANCE WITH ESTIMATION OF SOME RESERVOIR PROPERTIES. PRES. ROCKY MOUNTAIN REG. MEETING, CASPER, WY., MAY 15-16, 1973, AND FALL MEETING, LAS VEGAS, NEV., OCT. 1-3, 1973, SOC. PETROL ENG., AIME, SPE PREPRINT 4412, 8 P.; 5. H. J. LECHTENBERG, G. L. GATES, ET AL. FIELD STUDY OF VISCOUS OIL PRODUCTION BY SOLVENT STIMULATION, WILMINGTON CALIFORNIA. BUMINES TPR 62, 1972, 12 PP.

00000236

PROJECT TITLE:

ENGINEERING DEVELOPMENT AND ENVIRONMENTAL ASPECTS OF INSITU PROCESSING OF OIL SHALE

INVESTIGATORS:
H. W. SOHNS; H. C. CARPENTER; H. B. JENSEN; R. E. POULSON
RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
LARAMIE ENERGY RESEARCH CENTER
LARAMIE, WY 82071
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
1973 - 1,590,000
1974 - 1,085,000
1975 - 1,700,000
TIME FRAME:
07 01 64 TO 06 01 78
LOCATION:
WY
ABSTRACT:

THE OBJECTIVES OF THIS PROJECT ARE: TO INVESTIGATE IN-SITU RETORTING AS A POTENTIALLY EFFECTIVE MEANS OF PROCESSING OIL SHALE; TO ASSESS THE ENVIRONMENTAL CHANGES THAT MAY BE EXPECTED TO ATTEND OIL-SHALE RETORTING BY INSITU METHODS; AND, TO A LESSER EXTENT, TO ASSESS THE ENVIRONMENTAL CHANGES THAT MAY BE EXPECTED TO ACCOMPANY ABOVEGROUND RETORTING METHODS. THE INSITU RETORTING RESEARCH INVOLVES AN INTEGRATED EFFORT THAT INCLUDES: LABORATORY STUDIES OF INSITU FUNDAMENTALS, SUCH AS KINETICS AND MECHANICS OF RETORTING; BENCH-SCALE AND PILOT-SCALE EXPERIMENTATION UNDER SIMULATED INSITU CONDITIONS; AND FIELD TESTS. THIS INSITU FIELD EFFORT INCLUDES FORMATION-FRACTURING EXPERIMENTATION TO PRODUCE FLOW PATHS THROUGH THE SHALE AS A NECESSARY, PREPARATORY STEP FOR INSITU PROCESSING. THE ENVIRONMENTAL ASPECTS OF THE RESEARCH ARE CONCERNED WITH THE FLUID-MIGRATION CHARACTERISTICS OF GASES, OILS, AND WATER THAT ARE PRODUCED INCIDENTAL TO INSITU AND ABOVEGROUND RETORTING. THE ENVIRONMENTAL ASPECTS ARE ALSO CONCERNED WITH THE CHANGES TO THE ENVIRONMENT THAT WILL BE BROUGHT ABOUT BY DISPOSING OF THE SHALE BROUGHT TO THE SURFACE BY MODIFIED INSITU RETORTING. CURRENT EMPHASIS (FY 75) IS ON THE RESEARCH IN CONNECTION WITH A FIELD INSITU TEST ON SITE 9 NEAR ROCK SPRINGS, WYOMING AND ON ESTABLISHING ENVIRONMENTAL BASELINES FOR THIS TEST AND FOR POSSIBLE FUTURE INSITU PROGRAMS THAT WILL UTILIZE WYOMING OIL SHALES.

REPORTS AND PUBLICATIONS:

THE LIST OF PUBLICATIONS WHICH HAVE RESULTED FROM THIS RESEARCH CAN BE FOUND IN THE FOLLOWING: 'A BIBLIOGRAPHY OF OIL SHALE OIL.' AVAILABLE FROM THE LIBRARIAN, LARAMIE ENERGY RESEARCH CENTER, P.O. BOX 3395, UNIVERSITY STATION, LARAMIE, WY 82071.

00000237
PROJECT TITLE:
PROPERTIES OF SULFONATION REACTIONS AND PETROLEUM SULFONATES
INVESTIGATORS:
D. A. JAEGER; R. E. BARDEN
RESEARCH FACILITY:
UNIV. OF WYOMING, DEPT. OF CHEMISTRY
LARAMIE, WY 82071
PRIMARY SPONSOR:
MARATHON OIL CO.
PRIMARY FUNDING AMOUNT:
1973 - 20,000
1974 - 20,000
TIME FRAME:
10 01 72 TO 09 31 75
LOCATION:
WY
ABSTRACT:

THE RESEARCH IS DIRECTED TOWARDS DEFINING THE SITES OF SULFONATION IN MODEL SYSTEMS DESIGNED IN THE LABORATORY AND IN CRUDE PETROLEUM. THE PHYSICO-CHEMICAL PROPERTIES OF THE SULFONATED PETROLEUM ARE ALSO BEING INVESTIGATED, PARTICULARLY IN AN ATTEMPT TO DISCOVER EFFICIENT METHODS OF SCREENING PETROLEUM SULFONATES FOR APPLICATION IN PETROLEUM RECOVERY OPERATIONS. PHYSICAL PROPERTIES OF POLYMERS OF POTENTIAL USE AS VISCOSITY BUILDERS IN RESERVOIR FLOODING OPERATIONS ARE UNDER INVESTIGATION, TOO.

00000238
PROJECT TITLE:
CHARACTERIZATION OF METAL-COMPOUNDS IN CRUDE OILS
INVESTIGATORS:
AMERICAN PETROLEUM INSTITUTE
ESSO RESEARCH & ENGINEERING CO.
RESEARCH FACILITY:
NORTH DAKOTA STATE UNIV.
COLLEGE OF SCIENCE & MATHEMATICS
FARGO, ND 58102
PRIMARY FUNDING AMOUNT:
1971 - 24,500
1972 - 25,000
1973 - 10,000
TIME FRAME:
07 01 59 - INDEFINITE
LOCATION:
ND
ABSTRACT:

PRESENCE OF METALS IN PETROLEUM HAS A DELETERIOUS EFFECT IN SEVERAL REFINERY OPERATIONS AS WELL AS IN ITS DIRECT APPLI-

CATION AS A FUEL. SUCH CONCERNS BECOME MORE SIGNIFICANT AS UTILIZATION OF RESIDUAL FRACTIONS INCREASES AND ALSO WITH THE NEED TO PROCESS LESS DESIRABLE WORLD CRUDES. OXOVANADIUM (IV) AND NICKEL (II) CHELATES NORMALLY CONTAINED IN FOSSIL FUELS HAVE BEEN INVESTIGATED. A VARIETY OF SEPARATION TECHNIQUES HAS BEEN DEVELOPED AND SEVERAL TYPES OF METALLOPORPHYRINS HAVE BEEN IDENTIFIED. THE CHEMISTRY OF PORPHYRINS HAS IN GENERAL BEEN SCRUTINIZED, PARTICULARLY THOSE REACTIONS INVOLVING METALATION AND DEMETALATION. THESE STUDIES HAVE BEEN CARRIED OUT IN NONAQUEOUS MEDIA WITH POLARITY SIMILAR TO PETROLEUM. A NEW APPROACH TO THE DEMETALATION OF METALLOPETROPORPHYRINS HAS BEEN RECENTLY UNCOVERED. THIS PROCESS APPEARS TO HAVE AN UNUSUAL DEGREE OF SELECTIVITY IN EFFECTING METAL REMOVAL FROM CRUDES AND FRACTIONS DERIVED THEREFROM.

REPORTS AND PUBLICATIONS:

(1)A. BLUESTEIN, J. M. SUGIHARA. METALATION OF ETIOPORPHYRIN I WITH NICKEL (II) 1,3-DIKETONATES. INORG. CHEM. 12, 609 (1973); (2)A. BLUESTEIN, J. M. SUGIHARA. PHOTO-INDUCED FORMATION OF COPPER (II) PORPHYRINS. J. INORG. NUCL. CHEM. 35, 1050, (1973); (3)W. E HAINES, C. C. WARD, ET AL. DEVELOPMENT OF ANALYTICAL TECHNIQUES FOR HEAVY HYDROCARBONS AND RELATED COMPOUNDS. PROC. DIV. REFINING AM. PETROL INST. 51, 375 (1971); (4)J. S. SUGIHARA, J. F. BRANTHAVER, ET AL. RESEARCH - PRESENT AND FUTURE. AMER. CHEM. SOC., DIV. PETROL CHEM., PREPRINTS 15 (2), C5 (1970); (5)D. J RISLOVE, A. T. O"BRIEN, ET AL. AN IMPROVED PREPARATION OF ETIOPORPHYRIN I. J. CHEM. ENG. DATA 13,588 (1968); (6)J. F. BRANTHAVER, G. Y. WU. ISOLATION AND PROPERTIES OF BOSCAN METALLOPORPHYRINS. AMER. CHEM. SOC. DIV. PETROL. CHEM. PREPRINTS 12 (2), A 75 (1967); (7) J. F. BRANTHAVER, J. M. SUGIHARA. REDUCTIVE DESULFERIZATION OF BOSCAN ASPHALTENES AND ITS IMPLICATIONS ON ASPHALTENE STRUCTURE. AMER, CHEM. SOC., DIV. PETROL. CHEM. PREPRINTS 11(2), E105, (1966); (8)J. M. SUGIHARA, T. OKADA, ET AL. REDUCTIVE DESULFERATION ON VANDIUM AND METALLOPORPHYRIN CONTENTS OF FRACTIONS FROM BOSCAN ASPHALTENES. J. CHEM. ENG. DATA 10,100, (1965); (9)J. S. SUGIHARA, R. G. GARVEY. DETERMINATION OF VANADYL PORPHYRINS BE DEMETALATION WITH HYDROGEN BROMIDE-FORMIC ACID. ANAL. CHEM. 36,2374 (1964); (10) J. M. SUGIHARA, TRACE METAL CONSTITUENTS IN PETROLEUM. PROC. AM. PETROLEUM INST. 42, 30 (1962).

00000239

PROJECT TITLE:
CHARACTERIZATION OF PETROLEUM

INVESTIGATORS:
J.S. BALL; G. U. DINNEEN

RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
DIVISION OF PETROLEUM & NATURAL GAS
4015 WILSON BLVD.
BALLSTON TOWERS NO. 3, SUIRE 340
ARLINGTON, VA 22203

PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN., BUREAU OF MINES
AMERICAN PETROLEUM INSTITUTE
U.S. DEPT. OF TRANSPORTATION, FEDERAL HIGHWAY ADMIN.
U.S. DEPT. OF DEFENSE, AIR FORCE OFFICE OF SCIENTIFIC RESEARC

PRIMARY FUNDING AMOUNT:
1971 - 966,000
1972 - 1,012,000
1973 - 950,000
1974 - 900,000

TIME FRAME:
01 01 69 - CONTINUING

LOCATION:
OK WY

ABSTRACT:
THE OBJECTIVES OF THIS PROJECT ARE MEASUREMENT OF APPROPRIATE THERMODYNATIC PROPERTIES OF ORGANIC COMPOUNDS, ANALYSIS OF THE QUALITY OF GASOLINE, AVIATION AND DIESEL FUELS, AND BURNER FUEL OILS; DEVELOPMENT OF ANALYTICAL METHODS FOR SEPARATING HEAVY ENDS OF CRUDE OILS, REMOVING ACIDS, BASES, AND NITROGEN COMPOUNDS, AND SEPARATING HEAVY PARAFFINS FROM AROMATICS; ANALYSIS OF ASPHALTS TO PREDICT DURABILITY AS ROADBUILDING MATERIAL; AND DETERMINATION OF CHEMICAL AND PHYSICAL PROPERTIES OF OIL FROM TAR SANDS.

REPORTS AND PUBLICATIONS:
SEE LISTS OF PUBLICATIONS ISSUED BY THE BUREAU OF MINES.

00000240

PROJECT TITLE:
OIL SHALE: CHARACTERIZATION AND EVALUATION OF THE RESOURCE

INVESTIGATORS:
G. U. DINNEEN

RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
LARAMIE ENERGY RESEARCH CENTER
P.O. BOX 3395, UNIVERSITY STATION
LARAMIE, WY 82070
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.

PRIMARY FUNDING AMOUNT:
1971 - 519,000
1972 - 549,000
1973 - 502,000
1974 - 410,000

TIME FRAME:
01 01 60 - CONTINUING

LOCATION:
WY

ABSTRACT:
ANALYSIS IS MADE OF OIL SHALE CORES AND OTHER SAMPLES WITH EMPHASIS ON GREEN RIVER FORMATION OF COLORADO, UTAH AND

WYOMING. ASSAY DATA, KEROGEN CONTENT AND CHARACTERISTICS, AND MINERALOGY ARE CORRELATED STRATIGRAPHICALLY AND GEOGRAPHICALLY TO PREDICT SHALE QUALITY OVER LARGE AREAS. A CORE DRILLED IN WYOMING'S WASHAKIE BASIN IN 1971 WITH PRIOR CORE HOLES, IS EXPECTED TO DEFINE THAT BASIN'S RESOURCE. SOME INITIAL CORE AND DRILL-CUTTING SAMPLES FROM UTAH HAVE BEEN EVALUATED. A SHIFT IN EMPHASIS IS PLANNED IN 1972 TO UTAH AND WYOMING BASINS FROM COLORADO WHERE EVALUATION IS LARGELY COMPLETED. DEPARTMENTAL PROTOTYPE LEASING PROGRAM MAY AFFECT EMPHASIS AS INFORMATION ON SPECIFIC SITE EVALUATIONS IS NEEDED.

REPORTS AND PUBLICATIONS:
'BIBLIOGRAPHY OF OIL SHALE & SHALE OIL', BUREAU OF MINES PUBLICATIONS, OSRD 59, 1972 LARAMIE ENERGY RESEARCH CENTER.

0000241
PROJECT TITLE:
OIL SHALE RESEARCH: PRODUCTION OF CLEAN FUELS FROM OIL SHALE
INVESTIGATORS:
G. U. DINNEEN
RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.,
LARAMIE ENERGY RESEARCH CENTER
P.O. BOX 3395, UNIVERSITY STATION
LARAMIE, WY 82070
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
1972 - 473,000
1973 - 537,000
1974 - 577,000
TIME FRAME:
01 01 63 TO 01 01 78
LOCATION:
WY
ABSTRACT:

THIS PROJECT IS DESIGNED TO INVESTIGATE MEANS OF EFFECTIVELY PRODUCING HIGH QUALITY OIL SHALE FUELS AND CHEMICAL BYPRODUCTS. SHALE OILS PRODUCED UNDER DIFFERENT CONDITIONS AND FROM DIFFERENT PROCESSES ARE CHARACTERIZED AND REFINED USING SMALL PILOT-SCALE EQUIPMENT. TO A MAJOR DEGREE, MODERN REFINING PROCESSES OF THE PETROLEUM INDUSTRY ARE EMPLOYED WITH MODIFICATIONS IN CONDITIONS AS MAY BE FOUND NECESSARY TO YIELD ACCEPTABLE RESULTS WITH SHALE OIL. INNOVATIVE TECHNIQUES, SUCH AS CONTROLLED OXIDATION, ALSO ARE INVESTIGATED TO A SMALLER EXTENT. THE RESULTS ARE CORRELATED WITH THE CHARACTERISTICS AND PRODUCTION HISTORY OF THE CRUDE SHALE OIL UNDER CONSIDERATION. A LABORATORY EFFORT ALSO HAS BEEN INITIATED TO INVESTIGATE THE POTENTIAL OF GAS PRODUCTION FROM SHALE OIL AND OIL SHALE, THE LATTER BY IN SITU METHODS. CURRENT EMPHASIS IN THE REFINING PHASE OF THIS PROJECT IS ON THE REFINABILITY OF IN SITU CRUDE SHALE OILS. THE GASIFICATION EFFORT IS BEING INCREASED MODERATELY IN FISCAL YEAR 1974, BUT NO MAJOR EXPANSION IS CONTEMPLATED PENDING COMPLETION OF THE ONGOING PRELIMINARY INVESTIGATION.

REPORTS AND PUBLICATIONS:
'BIBLIOGRAPHY OF OIL SHALE AND SHALE OIL' BUREAU OF MINES PUBLICATIONS, OSRD 59, 1972. AVAILABLE FROM LARAMIE ENERGY RESEARCH CENTER.

0000242
PROJECT TITLE:
OIL SHALE RETORTING: ENVIRONMENTAL PROBLEMS
RESEARCH FACILITY:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
LARAMIE ENERGY RESEARCH CENTER
P.O. BOX 3395, UNIVERSITY STATION
LARAMIE, WY 82070
PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
PRIMARY FUNDING AMOUNT:
1971 - 248,000
1972 - 1,563,000
1973 - 1,590,000
1974 - 1,085,000
TIME FRAME:
01 01 64 TO 01 01 78
LOCATION:
WY
ABSTRACT:

THE OBJECTIVES OF THIS PROJECT ARE TO INVESTIGATE IN SITU RETORTING AS A POTENTIALLY EFFECTIVE AND ENVIRONMENTALLY ATTRACTIVE MEANS OF PRODUCING SHALE OIL AND TO ASSESS THE ENVIRONMENTAL PROBLEMS THAT MAY BE EXPECTED TO ATTEND OIL SHALE RETORTING BY EITHER IN SITU OR CONVENTIONAL ABOVEGROUND METHODS. THE IN SITU RESEARCH INVOLVES AN INTEGRATED EFFORT THAT INCLUDES LABORATORY STUDIES OF FUNDAMENTALS SUCH AS KINETICS AND MECHANISMS OF RETORTING REACTIONS, BENCH- AND PILOT-SCALE EXPERIMENTATION UNDER SIMULATED IN SITU CONDITIONS, AND ACTUAL FIELD TESTS. THE FIELD EFFORT ALSO INCLUDES FORMATION FRACTURING EXPERIMENTATION, AS FRACTURING TO PRODUCE FLOW PATHS THROUGH THE SHALE IS A NECESSARY PREPARATORY STEP FOR IN SITU PROCESSING. THE ENVIRONMENTAL ASPECT OF THE PROJECT IS CONCERNED WITH THE POLLUTIONAL CHARACTERISTICS OF GASES AND WATERS PRODUCED INCIDENTAL TO EITHER IN SITU OR ABOVEGROUND RETORTING AND WITH DEVELOPMENT OF APPROPRIATE METHODS OF TREATMENT AS THE NEED IS INDICATED. ENVIRONMENTAL PROBLEMS AND REMEDIES IN THE AREA OF DISPOSAL OF SPENT SHALES FROM ABOVEGROUND RETORTING ALSO ARE INVESTIGATED. BECAUSE OF BUDGETARY CONSTRAINTS, SIGNIFICANT REDUCTION OF THE IN SITU RETORTING

WORK BECAME NECESSARY IN FISCAL YEAR 1974, AND THE ENVIRONMENTAL RESEARCH HAS BEEN VIRTUALLY RECESSED EXCEPT FOR MONITORING ACTIVITIES IN CONNECTION WITH RETORTING EXPERIMENTS.

REPORTS AND PUBLICATIONS:

SEE BIBLIOGRAPHY OF OIL SHALE AND SHALE OIL. BUREAU OF MINES PUBLICATIONS, OSRD 59, 1972. AVAILABLE FROM LARAMIE ENERGY RESEARCH CENTER.

00000243

PROJECT TITLE:

IMPROVED PETROLEUM AND NATURAL GAS RECOVERY

INVESTIGATORS:

U.S. DEPT. OF INTERIOR, BUREAU OF MINES
U.S. ERDA, DIV. OF APPLIED TECHNOLOGY
AMERICAN GAS ASSOCIATION

RESEARCH FACILITY:

U.S. DEPT. OF INTERIOR, BUREAU OF MINES,
DIVISION OF PETROLEUM & NATURAL GAS
4015 WILSON BLVD.
BALLSTON TOWERS 3, SUITE 340
ARLINGTON, VA 22203

PRIMARY FUNDING AMOUNT:

PROPRIETARY

TIME FRAME:

01 01 69 TO INDEFINITE

LOCATION:

OK WV WY CA

ABSTRACT:

RESEARCH ON THE STIMULATION OF PETROLEUM AND NATURAL GAS INCLUDES TWO GENERAL AREAS: (1)FRACTURING OF LOW-PERMEABILITY FORMATIONS; AND (2) FLUID INJECTION TECHNIQUES. IN THE FIRST AREA, METHODS HAVE BEEN DEVISED AND APPLIED FOR CORRELATING SURFACE TRENDS AND LINEAMENTS WITH THE DIRECTIONAL ORIENTATION OF NATURAL AND INDUCED FRACTURES, THE DRILLING OF WELLS DEVIATED FROM VERTICAL TO INTERSECT NATURAL FRACTURES, AND COMBINING HYDRAULIC AND CHEMICAL-EXPLOSIVE FRACTURING METHODS TO PRODUCE ADDITIONAL, TRANSVERSE FRACTURES. THE SECOND AREA ENCOMPASSES COMBINATIONS OF SECONDARY WATERFLOODING AND TERTIARY RECOVERY METHODS; SUCH AS, THE INJECTION OF GAS, INCLUDING CARBON DIOXIDE; WATER, INCLUDING SPECIFIC ADDITIVES; MISCIKLE FLUIDS; EMULSIONS AND POLYMERS; STEAM AND HOT WATER; AND AIR FOR IN SITU COMBUSTION. GAS WELLS HAVE BEEN TREATED BY DETONATING EXPLOSIVES IN FRACTURES INDUCED HYDRAULICALLY, WITH PRODUCTION INCREASES UP TO 40 PERCENT. IF THIS RESEARCH IS CONTINUED UNDER AN EXPANDED PROGRAM, PARTICULARLY TO THE POINT WHERE MASSIVE FRACTURES CAN BE INDUCED, THE TECHNIQUES MIGHT RESULT IN THE ECONOMIC PRODUCTION OF A SUBSTANTIAL BUT AS YET UNQUANTIFIED AMOUNT OF NATURAL GAS IN RELATIVELY THIN AND SHALLOW RESERVOIRS, AND AS MUCH AS 200 TRILLION CUBIC FEET IN THE DEEP, THICK GAS SANDS OF ROCKY MOUNTAIN BASINS. OPTIMUM FLUID-INJECTION RESEARCH COULD MATERIALLY IMPROVE THE PRESENT AVERAGE EFFICIENCY OF PRODUCING OIL BY ALL METHODS (ABOUT ONE-THIRD OF THE ORIGINAL OIL-IN-PLACE), WITH A RESULTANT ADDITION TO PROVED RESERVES OF ABOUT 3 BILLION BARRELS FOR EACH ONE PERCENT OF IMPROVEMENT, AND PERMIT THE PRODUCTION OF AN APPRECIABLE PART OF SOME ADDITIONAL 60 BILLION BARRELS NOT NOW CONSIDERED TO BE ECONOMICALLY PRODUCIBLE.

REPORTS AND PUBLICATIONS:

SEE LISTS OF PUBLICATIONS ISSUED BY THE BUREAU OF MINES.

00000244

PROJECT TITLE:

OPTIMAL PETROLEUM RESERVOIR MANAGEMENT USING MODERN CONTROL THEDRY

INVESTIGATORS:

RAYMOND G. JACQUOT; TERRENCE DWAN

PROJECT SUPERVISOR:

R. G. JACQUOT
UNIV. OF WYOMING
DEPT. OF ELECTRICAL ENGINEERING
LARAMIE, WY 82071
307-766-2279

PRIMARY SPONSOR:

UNIV. OF WYOMING
LARAMIE, WY 82071

TIME FRAME:

06 01 74 TO 08 31 75

LOCATION:

WY CO

ABSTRACT:

A DYNAMIC PETROLEUM RESERVOIR IS SOUGHT USING A MODERN SYSTEM THEORETIC APPROACH. IN CONTRAST TO THE COMMONLY USED MECHANISTIC APPROACH, IT IS NOT NECESSARY TO SPECIFY THE INTERNAL CHARACTERISTICS OF THE RESERVOIR IN ORDER TO DESCRIBE ITS BEHAVIOR BY THE PROPOSED METHOD. A SUITABLE LINEAR MODEL OF THE RESERVOIR HAS BEEN ACHIEVED. OPTIMIZATION OF SOME, AND PERHAPS ALL, OF THE SYSTEM PARAMETERS AND CONTROLS WILL BE INVESTIGATED.

THE APPROACH COULD HAVE BROAD APPLICATIONS IN PREDICTING THE FUTURE PERFORMANCE AND OPTIMAL EXTRACTION POLICY FOR PETROLEUM AND GAS RESERVES, AS WELL AS OTHER NATURAL RESOURCES. A NATURAL EXTENSION OF THIS WORK WOULD BE TO APPLY THESE SYSTEM IDENTIFICATION AND OPTIMAL CONTROL TECHNIQUES TO OTHER COMPLEX ENERGY RESOURCE SYSTEMS.

PRODUCTION DATA ON A PETROLEUM RESERVOIR, LOCATED AT RANGELY, COLORADO HAS BEEN OBTAINED FROM THE CHEVRON CORP. A SEGEMENT OF THIS RESERVOIR CONTAINING ELEVEN WELL HEADS HAS BEEN MODELED TO PROVE THE FEASIBILITY OF A MODERN SYSTEM THEORY APPROACH TO THE MODELING OF THIS TYPE OF PROBLEM.

TWO TECHNIQUES, CLASSICAL DYNAMIC LEAST SQUARES AND AN ITERATIVE PARAMETER UPDATING SCHEME, HAVE BEEN USED TO GENERATE THE BEST LINEAR, TIME- INVARIANT MODEL FOR THE RESERVOIR SEGMENT. WITH THE SYSTEM IDENTIFICATION PROBLEM SOLVED, OPTIMAL EXTRACTION POLICY FOR THE RESERVOIR MANAGEMENT WILL BE ADDRESSED. FUNCTIONS THAT INDICATE WHICH PARAMETERS OF THE GIVEN PETROLEUM RESERVOIR SYSTEM ARE THE MOST IMPORTANT, EITHER FROM A USER OR A PRODUCER VIEWPOINT, WILL BE DEVELOPED DUREING THE COURSE OF THIS PROJECT. A FAMILY OF FUNCTIONS, WHICH WE SHALL CALL COST BENEFIT FUNCTIONS, HAVE BEEN DEVELOPED WHICH ARE REPRESENTATIVE OF SEVERAL SITUATIONS WHERE OPTIMAL EXTRACTION POLICY IS ONE WHICH MINIMIZES A PARTICULAR COST FUNCTION.

CC000245
PROJECT TITLE:
DEPOSITIONAL ENVIRONMENT OF THE GREEN RIVER FORMATION:
OIL SHALE AND EVAPORITE MINERAL ORIGIN
PROJECT SUPERVISOR:
RONALD C. SURDAM
UNIV. OF WYOMING, DEPT. OF GEOLOGY
UNIVERSITY STATION
LARAMIE, WY
307-766-4200
PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION
WASHINGTON, DC 20550
SECONDARY SPONSORS:
UNIV. OF WYOMING
PRIMARY FUNDING AMOUNT:
34,124
SECONDARY FUNDING AMOUNTS:
7,800
TIME FRAME:
12 01 74 TO 11 30 76
LOCATION:
WY CO
ABSTRACT:

NEW OBSERVATIONS IN THE WILKINS PEAK AND TIPTON SHALE MEMBERS OF THE GREEN RIVER FORMATION SUGGEST THAT MOST OF ANCIENT 'LAKE GOSIUTE' WAS IN FACT A PLAYA-LAKE. THESE OBSERVATIONS INCLUDE ABUNDANT SEDIMENTARY STRUCTURES WHICH INDICATE SUBAERIAL EXPOSURE, TRACTION TRANSPORT, AND CLASTIC ORIGIN OF THE GREEN RIVER ROCKS, PARTICULARLY THE CARBONATES. IN CONTRAST, THE STANDARD MODEL FOR THE GREEN RIVER FORMATION, A REFERENCE FOR LACUSTRINE DEPOSITS, IS BASED ON IN SITU PRECIPITATION FROM A CHEMICALLY STRATIFIED LAKE. UNLIKE THE STANDARD MODEL, THE NEW PLAYA MODEL EXPLAINS SEVERAL ASPECTS OF THE GREEN RIVER FORMATION THAT HERETOFORE WERE INADEQUATELY UNDERSTOOD, SUCH AS 1. THE MG-CA SUPPLY, 2. THE PRESENCE OF ORGANIC-RICH DOLOMITES (OIL SHALE), AND 3. THE FREQUENT AND SUDDEN CHANGE FROM ALKALINE EARTH TO ALKALI CHEMISTRY. IT IS PROPOSED TO FURTHER TEST THIS NEW MODEL IN BASIN-WIDE INTEGRATED INTERDISCIPLINARY STUDIES OF BOTH SURFACE AND SUBSURFACE OBSERVATIONS.

TWO MAIN OBJECTIVES THAT WE HOPE TO ACCOMPLISH DURING THE PROJECT ARE: 1. TO CONTINUE WORKING ON THE LANEY SHALE MEMBER, PARTICULARLY IN THE WASHAKIE BASIN, FOR THE LANEY CONTAINS THE THICKEST AND RICHEST OIL SHALE IN WYOMING. ALONG THE KINNEY RIM THICK OIL-SHALE SECTIONS IN THE LANEY REPRESENT 155 MILLION BARRELS OF OIL IN PLACE PER SQUARE MILE. THE PRIMARY OBJECTIVE IS TO DEVELOP A DETAILED SEDIMENTOLOGICAL MODEL FOR THE LANEY SHALE MEMBER AND TO DETERMINE IF IT IS COMPATIBLE WITH THE PLAYA-LAKE MODEL.

2. SECONDLY, WE INTEND TO CONSTRUCT A SEDIMENTOLOGICAL MODEL OF THE GREEN RIVER FORMATION IN THE PICEANCE CREEK BASIN OF COLORADO. THE ULTIMATE TEST OF THE PLAYA-LAKE MODEL WILL BE TO APPLY IT TO THE GREEN RIVER FORMATION IN THE PICEANCE CREEK BASIN. THE CARBONATES IN THE MAHOGANY ZONE OIL SHALES IN THE PICEANCE CREEK BASIN ARE THOUGHT TO BE THE RESULT OF PRECIPITATION

FROM A CHEMICALLY STRATIFIED LAKE. THERE ARE SIMILARITIES AND DIFFERENCES IN THE FORMATION BETWEEN THE GREEN RIVER AND PICEANCE CREEK AREAS TO BE STUDIED, ALSO.

IT IS OBVIOUS FROM THE SCOPE OF THIS PROBLEM THAT AN INTERDISCIPLINARY APPROACH IS IMPERATIVE. ONLY BY INTEGRATING EXPERTISE IN GEOCHEMISTRY-MINERALOGY, SEDIMENTOLOGY, CLOSED BASIN HYDROLOGY, STRATIGRAPHY AND FIELD GEOLOGY, CAN THE PROPOSED MODEL BE THOROUGHLY AND RIGOROUSLY EVALUATED.

REPORTS AND PUBLICATIONS:

SURDAM, R.C., AND C.A. WOLFBAUER, 'ORIGIN OF OIL SHALE IN THE GREEN RIVER FORMATION, WYOMING,' WYO. GEOLOGICAL ASSOC. 25TH FIELD CONFERENCE GUIDEBOOK, 1973.

SURDAM, R.C. AND J.L. WRAY, 'NONMARINE STROMATOLITES, EOCENE GREEN RIVER BASIN, WYOMING,' IN MALCOLM WALTER (ED.) INTERPRETING STROMATOLITES, ELSEVIER, AMSTERDAM, 1974.

00000246

PROJECT TITLE:

A STUDY OF THE RELATIONS BETWEEN CEMENTATION, PRIMARY TEXTURES AND DEPOSITIONAL ENVIRONMENTS OF THE NUGGET SANDSTONE.

PROJECT SUPERVISOR:

JAMES R. STEIDTMANN
UNIV. OF WYOMING, DEPT. OF GEOLOGY
UNIVERSITY STATION
LARAMIE, WY 82071
307-766-4232

PRIMARY SPONSOR:

U.S. GEOLOGICAL SURVEY

SECONDARY SPONSORS:

UNIV. OF WYOMING

PRIMARY FUNDING AMOUNT:

5,172

SECONDARY FUNDING AMOUNTS:

3,434

TIME FRAME:

07 01 75 TO 06 30 76

LOCATION:

WY UT

ABSTRACT:

COMMODITY: PETROLEUM. MUCH REMAINS TO BE UNDERSTOOD ABOUT RELATIONS AMONG THE PHYSICAL AND CHEMICAL VARIABLES INVOLVED IN SANDSTONE DIAGENESIS. ONE PARTICULAR ASPECT OF THE TOTAL DIAGENETIC PICTURE WHICH DESERVES ATTENTION CONCERNS THE CONTROL EXERTED ON PRIMARY CEMENTATION BY INITIAL POROSITY AND PERMEABILITY OF THIS SEDIMENT.

THE NECESSITY FOR RATHER CONTINUOUS FLUID MOVEMENT TO SUPPLY SUFFICIENT PRECIPITATE FOR CEMENTATION IMPLIES THAT THIS CONTROL MAY INDEED BE CONSIDERABLE. BECAUSE INITIAL POROSITY AND PERMEABILITY ARE A FUNCTION OF PRIMARY TEXTURE, AND THIS IN TURN IS RELATED TO DEPOSITIONAL PROCESS AND ENVIRONMENT, A DETERMINATION OF THE RELATIONS BETWEEN CEMENTATION, TEXTURE AND DEPOSITIONAL ENVIRONMENTS MAY LEAD TO BETTER UNDERSTANDING OF EARLY DIAGENETIC SEQUENCES AND PATTERNS. THESE RELATIONS IN THE NUGGET SANDSTONE ARE THE SUBJECT OF OUR PROPOSED INVESTIGATION.

THE NUGGEST SANDSTONE WAS CHOSEN BECAUSE PREVIOUS STUDIES SHOW A WIDE RANGE IN TEXTURAL CHARACTER, LITHOGRAPHIC AND STRATIGRAPHIC RELATIONS AND SEDIMENTARY STRUCTURES INDICATE SEVERAL DEPOSITIONAL ENVIRONMENTS (BOTH EOLIAN AND SUBAQUEOUS), THE TYPES OF DEGREE OF CEMENTATION VARY LATERALLY IN SUBSURFACE AND AT THE SURFACE, POORLY UNDERSTOOD MINERALIZATION SUGGESTS AREAL AND STRATIGRAPHIC VARIATIONS IN CONTROLLING FACTORS AND IT HAS RECENTLY BECOME A MORE INTRIGUING TARGET FOR HYDROCARBON EXPLORATION.

THE STUDY WILL BE CONDUCTED BY COLLECTING SAMPLES FROM SURFACE AND SUBSURFACE SECTIONS; NORTHEASTERN UTAH AND SOUTHWESTERN WYOMING WILL BE ONE AREA STUDIED. THE OTHER AREA WILL RUN ALONG A NORTH-EASTERLY LINE FROM CENTRAL-WESTERN WYOMING TO THE WIND RIVER BASIN. THIN-SECTIONS WILL BE EXAMINED USING CATHODE LUMINESCENCE MICROSCOPY.

IF THE RESULTS INDICATE THAT PRIMARY CEMENTATION PATTERNS CAN BE RELATED TO DEPOSITIONAL ENVIRONMENTS, AN EXPANDED PROGRAM WILL BE UNDERTAKEN FOR THE PURPOSE OF ESTABLISHING THE AREAL AND STRATIGRAPHIC DISTRIBUTION OF SEDIMENTS RELATED TO THESE ENVIRONMENTS. SUCH AN EXPANDED PROGRAM MAY THEN SUPPLY THE NECESSARY INFORMATION FOR PREDICTING PATTERNS OF CEMENTATION FROM ENVIRONMENTAL TRENDS.

REPORTS AND PUBLICATIONS:

STEIDTMANN, JAMES, 'DEPOSITION OF SANDSTONE IN THE CASPER FORMATION OF THE SOUTHERN LARAMIE BASIN AS INDICATED BY SETTLING VELOCITIES OF LIGHT AND HEAVY GRAINS,' ACCEPTED BY JOUR. OF SED. PETROL. 1975.

STEIDTMANN, JAMES, 'EVIDENCE FOR EOLIAN ORIGIN OF CROSS-STRATIFICATION IN SANDSTONE OF THE CASPER FORMATION, SOUTHERNMOST LARAMIE BASIN, WYOMING,' GEOL. SOC. OF AMER. BULL., VOL. 85, 1975.

00000247

PROJECT TITLE:

A SPECIAL INITIATIVE RESEARCH PROPOSAL FOR THE EVALUATION OF A GEOTHERMAL AREA OF ABNORMALLY HIGH HEAT FLOW AT MARYSVILLE, MONTANA

INVESTIGATORS:

D. H. STEWART; W. R. MCSPADDEN

RESEARCH FACILITY:

BATTELLE PACIFIC NORTHWEST LABORATORIES
PHYSICS & INSTRUMENTATION DEPT.
RICHLAND, WA 99352

PRIMARY SPONSOR:

NATIONAL SCIENCE FOUNDATION, RANN

PRIMARY FUNDING AMOUNT:

1973 - 265,000
1974 - 1,800,000
1975 - 245,000

TIME FRAME:

05 01 73 TO 06 01 75

LOCATION:

TX WA MT

ABSTRACT:

THE DRILLING OF THE DEEP GEOTHERMAL RESEARCH WELL AT THE EMPIRE MINE, NEAR MARYSVILLE, MONTANA WAS COMPLETED ON AUGUST 30, 1974. THE HOLE WAS DRILLED TO A DEPTH OF 6,790 FEET THROUGH GRANITE WHICH WAS FOUND TO BE HIGHLY FRACTURED. TWELVE MAJOR FRACTURE ZONES WERE ENCOUNTERED, IN ADDITION TO THE EXTENSIVE MINOR FRACTURES THROUGHOUT THE REGION. THE GRANITIC BODY WAS INTRUDED AS HOT MAGMA PROBABLY ABOUT 40 MILLION YEARS AGO AND WAS FRACTURED BY COOLING AND OTHER TECTONIC STRESSES. TO THE SURPRISE OF THE SCIENTISTS, LARGE FLOWS OF WATER (255GPM) FROM SOME FRACTURE ZONES INTO OTHERS WERE MEASURED IN THE WELL. SURFACE SURVEYS CONDUCTED PRIOR TO 1974 OF ELECTRICAL RESISTIVITY, MICROSEISMICS, HEAT FLOW, GRAVITY, MAGNETIC FIELD, ETC., FAILED TO SHOW THE PRESENCE OF THE WATER. EXPECTATIONS OF FINDING A SHALLOW MAGMA CHAMBER WERE BASED UPON THE SURFACE SURVEYS AND THE HYPOTHESIS THAT THE BODY WAS RELATIVELY FREE OF WATER. HOWEVER, NO MAGMA CHAMBER WAS FOUND AND MAXIMUM TEMPERATURES ENCOUNTERED WERE ABOUT 200 DEGREES F. THE SOURCE OF THIS HEAT WAS NOT LOCATED. ALTHOUGH THE PROJECT DID NOT REVEAL A GEOTHERMAL SOURCE OF COMMERCIAL VALUE, THE SCIENTIFIC INFORMATION BEING GENERATED WILL BE OF GREAT VALUE TO THE GEOTHERMAL INDUSTRY. FUNDING FOR THE PROJECT TERMINATES IN JUNE 1975 THE COMPLETION OF THE CURRENT SCIENTIFIC STUDIES BEING DONE AT THE CONTRACTOR RESEARCH LABORATORIES. TO MAKE MOST EFFICIENT USE OF THE FUNDS EXPENDED TO DATE, WE BELIEVE THAT ADDITIONAL RESEARCH WORK IS NEEDED TO STUDY THE HYDROLOGY AND ITS RELATIONSHIP TO THE HEAT FLOW. THIS WORK SHOULD INCLUDE PUMP TESTS AND A REGIONAL HYDROLOGY STUDY, AND SHOULD BE UNDERTAKEN IN FY76. AT THE PRESENT NO ACTIVITY IS TAKING PLACE AT THE DRILL SITE EXCEPT FOR PERIODIC LOGGING.

REPORTS AND PUBLICATIONS:

(1) THE MARYSVILLE, MONTANA, GEOTHERMAL PROJECT PRELIMINARY REPORT. (2) FIRST ANNUAL REPORT, PART 1 2. (3) FINAL REPORT. AVAILABLE FROM NSF.

00000248

PROJECT TITLE:

TECHNICAL FEASIBILITY STUDY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT

INVESTIGATORS:

H. W. TOWNES; E. H. BISHOP; R. E. POWE

RESEARCH FACILITY:

MONTANA STATE UNIV., DEPT. OF MECHANICAL ENG.
BOZEMAN, MT 59715

PRIMARY SPONSOR:

MONTANA STATE UNIV.
NATIONAL SCIENCE FOUNDATION

PRIMARY FUNDING AMOUNT:

1973 - 75,000

TIME FRAME:

06 01 73 TO 09 01 74

LOCATION:

MT

ABSTRACT:

THE OBJECTIVE OF THIS PROJECT WAS TO EVALUATE THE TECHNICAL FEASIBILITY OF A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED VEHICLE-AIRFOIL CONCEPT. SPECIFIC GOALS INCLUDE: 1) ESTABLISHMENT OF PERFORMANCE SPECIFICATIONS FOR THE MAJOR SYSTEM COMPONENTS AND IDENTIFICATION OF INTERFACE REQUIREMENTS, 2) FORMULATION OF ALTERNATIVE DESIGNS TO MEET THE FOREGOING CONDITIONS, 3) PERFORMANCE OF AN ENGINEERING ANALYSIS OF THESE SYSTEMS, IDENTIFICATION OF MAJOR STRENGTHS AND WEAKNESSES, AND SELECTION OF A PROMISING DESIGN, 4) INITIATION OF A DETAILED SYSTEMS DESIGN, INCLUDING ECONOMIC CONSIDERATIONS, TO ESTABLISH TECHNICAL FEASIBILITY. THIS PROJECT IS CONCERNED WITH ASSESSING THE TECHNICAL FEASIBILITY OF A NOVEL MOMENTUM-INTERCHANGE DEVICE WHICH INVOLVES VERTICAL AIRFOILS MOUNTED ON CARRIAGES WHICH MOVE ON A HORIZONTAL CLOSED TRACK SYSTEM.

REPORTS AND PUBLICATIONS:

1. REPORT NSF/RANN/SE/GI-39415/TR/73/1; 2. REPORT NSF/RANN/SE/GI-39415/PR/73/3; 3.REPORT NSF/RANN/SE/GI-39415/PR/74/7; 4.R. E. POWE, H. W. TOWNES, ET AL. WIND ENERGY CONVERSION, PRESENTED AT THE ROCKY MOUNTAIN SCIENCE COUNCIL ENERGY SYMPOSIUM, ALBUQUERQUE, NM, MARCH 1974; 5. R. E. POWER,

H. W. TOWNES, A WIND ENERGY CONVERSION SYSTEM BASED ON THE TRACKED-VEHICLE AIRFOIL CONCEPT, PRESENTED AT THE NINTH INTERSOCIETY ENERGY CONVERSION CONFERENCE, SAN FRANCISCO, AUGUST, 1974.

00000249
PROJECT TITLE:
MAGNETOTELLURIC STUDIES OF THERMAL AREAS
INVESTIGATORS:
R. A. PHINNEY
RESEARCH FACILITY:
PRINCETON UNIV. DEPT. OF GEOLOGICAL & GEOPHYSICAL SCI.
PRINCETON, NJ 08540
PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION
PRIMARY FUNDING AMOUNT:
1973 - 25,000
1974 - 25,000
1975 - 25,000
TIME FRAME:
04 01 70 TO 04 01 74
LOCATION:
WY NJ
ABSTRACT:

NATURALLY OCCURRING WEAK MICROPULSATIONS IN THE EARTH▫S MAGNETIC FIELD ARE COMPARED WITH ELECTRIC CURRENTS INDUCED IN THE EARTH TO PROVIDE ESTIMATES OF THE ELECTRICAL CONDUCTIVITY UNDER A RECORDING STATION. THIS IS BEING APPLIED IN THE YELLOWSTONE GEOTHERMAL REGION TO DETERMINE THE RELATIONSHIP BETWEEN SURFACE GEOTHERMAL PHENOMENA AND THE EFFECTIVE ELECTRICAL CONDUCTIVITY. IT HAS PROMISE AS A METHOD OF LOCATING AREAS OF HIGH NEAR-SURFACE HEAT FLOW WHERE SURFACE HYDROTHERMAL PHENOMENA ARE NOT APPARENT.

REPORTS AND PUBLICATIONS:
P. LEARY AND R. A. PHINNEY. A MAGNETOTELLURIC TRAVERSE ACROSS THE YELLOWSTONE REGIONS. GEOPHYS. RES. LETTERS, VOL. 1, 265-268, 1974.

00000250
PROJECT TITLE:
PERFORMANCE OF LOW COST SOLAR COLLECTORS AS SUPPLEMENTAL HEAT SOURCES FOR DRYING SHELLED CORN
INVESTIGATORS:
MYLO A. HELLICKSON; WILLIAM H. PETERSON
PROJECT SUPERVISOR:
MYLO A. HELLICKSON
AG. EXP. STATION, DEPT. OF AG. ENG.
SOUTH DAKOTA STATE UNIV.
BROOKINGS, SOUTH DAKOTA 57006
605-688-5141
ABSTRACT:

MANY OF THE TECHNIQUES DEVELOPED THROUGH SOLAR ENGERY RESEARCH HAVE CHARACTERISTICS THAT SEEM TO RENDER THEM ADAPTABLE TO AGRICULTURAL OPERATIONS. SOLAR ENERGY LOOKS PARTICULARLY ADAPTABLE FOR THOSE PROCESSES REQUIRING LOW TEMPERATURE RISE. HOWEVER, RESEARCH NEEDS TO BE CONDUCTED ON SPECIFIC APPLICATIONS FOR LOCAL AND REGIONAL CLIMATIC CONDITIONS. THEREFORE, A RESEARCH PROJECT TO EVALUATE THE PERFORMANCE OF FIVE TYPES OF LOW COST SOLAR COLLECTORS WAS INITIATED WITH THE FOLLOWING OBJECTIVES: 1. COMPARE THE PERFORMANCE OF SELECTED TYPES OF SOLAR COLLECTORS FOR SUPPLEMENTAL HEATING OF AIR USED FOR DRYING SHELLED CORN, 2. COMPARE DRYING RATES, FOR SHELLED CORN DRIED USING SELECTED COLLECTORS FOR PROVIDING SUPPLEMENTAL HEAT AND 3. ESTABLISH THE ECONOMIC AND ENERGY EFFICIENCIES OF DRYING SHELLED CORN USING SOLAR ENERGY AS A SUPPLEMENTAL HEAT SOURCE.

REPORTS AND PUBLICATIONS:
PETERSON, WILLIAM H. AND MYLO A. HELLICKSON. ´SOLAR-ELECTRIC DRYING OF CORN IN SOUTH DAKOTA´, ASAE PAPER NO. 75-3003, ASAE, ST. JOSEPH, MICHIGAN 45085. 1975.

00000251
PROJECT TITLE:
GEOTHERMAL POTENTIALS IN SOUTH DAKOTA
INVESTIGATORS:
DUNCAN J. MCGREGOR; ROBERT A. SCHOON
PROJECT SUPERVISOR:
DUNCAN J. MCGREGOR
SOUTH DAKOTA GEOLOGICAL SURVEY
UNIV. OF SOUTH DAKOTA, SCIENCE CENTER
VERMILLION, SD
605-624-4471
PRIMARY SPONSOR:
SOUTH DAKOTA GEOLOGICAL SURVEY
STATUS:
COMPLETED 04 01 74
LOCATION:
SD
ABSTRACT:

THE PURPOSE OF THIS REPORT IS TO ACQUAINT THE PUBLIC AND INTERESTED COMPANIES WITH THE POTENTIAL OF THE STATE IN REGARD TO GEOTHEMAL RESOURCES. IT HAS BEEN KNOWN FOR SOME TIME THAT AREAS OF THE STATE YIELDED ABNORMALLY WARM WATER FROM ARTESIAN WATER WELLS.
IN RESPONSE TO THE RECENT ENERGY SHORTAGE A PRELIMINARY SURVEY OF BOTTOM HOLE TEMPERATURES OF OIL TESTS AND ARTESIAN WATER TEMPERATURES WAS INSTITUTED. AREAS WITH THE GREATEST POTENTIAL OF GEOTHERMAL RESOURCES HAVE BEEN DELINEATED. CAUSES OF HIGH GEOTHERMAL GRADIENTS ARE DISCUSSED. INCLUDED IN THE APPENDIX IS A COMPLETE BASIC DATA INVENTORY THAT WAS EMPLOYED IN WRITING THE REPORT.

REPORTS AND PUBLICATIONS:
'GEOTHERMAL POTENTIALS IN SOUTH DAKOTA', SCHOON, R. A. AND MCGREGOR, D. J., SOUTH DAK. GEOL. SURVEY REPORT OF INVESTIGATIONS #110. 1974. AVAILABLE FROM SD GEOL. SURVEY, SCIENCE CENTER, UNIV. CAMPUS, VERMILLION, SD 57069. COST: 2.10 PER COPY.

00000252
PROJECT TITLE:
HEAT FLOW AND RADIOACTIVITY STUDIES
PROJECT SUPERVISOR:
EDWARD R. DECKER
UNIV. OF WYOMING
LARAMIE, WY
307-766-3278
PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION
WASHINGTON, DC 20550
SECONDARY SPONSORS:
UNIV. OF WYOMING
PRIMARY FUNDING AMOUNT:
103,122
SECONDARY FUNDING AMOUNTS:
9,989
TIME FRAME:
05 15 75 TO 05 14 77
LOCATION:
CO UT WY
ABSTRACT:
FUNDS WERE REQUESTED FOR ADDITIONAL HEAT FLOW AND RADIOACTIVITY STUDIES IN COLORADO, UTAH, AND WYOMING. THESE STUDIES WOULD PROVIDE FUNDAMENTAL INFORMATION ON THE FOLLOWING;

1. THE RELATIONSHIP BETWEEN HEAT FLOW AND HEAT PRODUCTION IN THE NORTHEASTERN COLORADO PLATEAU AND THE SAN JUAN MOUNTAINS. IN PARTICULAR, IT MAY BE POSSIBLE TO DIFFERENTIATE BETWEEN RADIOGENIC AND OTHER CRUSTAL HEAT SOURCES IN THESE AREAS AND CONFIRM THAT A LARGE PORTION OF THE NORTHEASTERN PLATEAU IS NOT A REGION OF UNIFORMLY LOW FLUX BETWEEN THE WESTERN GREAT BASIN AND SOURTHERN ROCKY MOUNTAINS.

2. THE RELATION BETWEEN CRUSTAL STRUCTURE, HEAT FLOW AND RADIOACTIVITY IN THE FRONT RANAGE OF THE ENTIRE SOUTHERN ROCKY MOUNTAINS. LIMITED SEISMIC AND GEOTHERMAL DATA INDICATE THAT A THINNER CRUST (40 VS. 55 KM) AND LOWER REDUCED HEAT FLOW (1.1 VS. 1.4 HFU) OCCUR IN THE FRONT RANGE IN WYOMING. THUS CONTINUED GEOTHERMAL STUDIES IN THESE MOUNTAINS IN WYOMING COULD INDICATE IF THE FRONT RANGE OF THE SOUTHERN ROCKIES SHOULD BE SUBDIVIDED INTO TWO PROVINCES THAT ARE CHARACTERIZED BY DIFFERENT HEAT FLOWS FROM THE LOWER CRUST AND UPPER MANTLE.

3. THE VERTICAL DISTRIBUTION OF RADIOACTIVITY TO DEPTHS OF 1.5 TO 3 KM IN TERTIARY PLUTONS IN THE COLORADO FRONT RANGE AND THE SOUTHERN ROCKY MOUNTAINS. IN PARTICULAR, IT MAY BE POSSIBLE TO SHOW IF UNIFORM OR EXPONENTIALLY DECREASING CRUSTAL RADIOGENIC HEAT PRODUCTION SHOULD BE USED FOR TEMPERATURE CALCULATIONS IN AND BELOW THE THICK (55KM) CRUST IN THE SOUTHERN ROCKIES. THE RESEARCH WILL BE CONDUCTED IN AREAS WHERE OTHER GEOPHYSICAL STUDIES MAY BE USED IN THE ANALYSIS AND INTERPRETATION OF THE GEOTHERMAL DATA. ALTHOUGH THE PROGRAM WILL USE A LIMITED NUMBER OF MINING COMPANY DRILL HOLES, THE FINAL RESOLUTION OF THE PROBLEMS WILL REQUIRE DRILLING HOLES SPECIFICALLY FOR COMBINED DETERMINATIONS OF FLUX AND BEDROCK RADIOACTIVITY. THE OBJECTIVES OF THIS PROGRAM ARE SCIENTIFIC IN NATURE; HOWEVER, ALL OF THE RESULTS WILL PROVIDE A VALUABLE FRAMEWORK FOR EVALUATION THE GEOTHERMAL-POWER POTENTIAL OF THE AREAS INVESTIGATED.

REPORTS AND PUBLICATIONS:
SMITHSON, S.B. AND E.R. DECKER, 'A CONTINENTAL CRUSTAL MODEL AND ITS GEOTHERMAL IMPLICATIONS,' EARTH PLANET.SCI. LETTERS, 22, 1974.
PRUSS, E.F., E.R. DECKER AND S.B. SMITHSON, 'GEOTHERMAL STUDIES IN ANTARTICA' PRELIMINARY TEMPERATURE MEASUREMENTS IN DRY VALLEY DRILLING PROJECT (DVDP) HOLES 3,4,6,8,' ANTARTIC JOURNAL OF THE U.S., IX, 1974.

00000253
PROJECT TITLE:
LOCATING AREAS OF HIGH WIND ENERGY POTENTIAL BY REMOTE OBSERVATIONS OF AEOLIAN GEOMORPHOLOGY
INVESTIGATORS:
RONALD W. MARRS; JOHN D. MARWITZ
PROJECT SUPERVISOR:
RONALD W. MARRS
UNIV. OF WYOMING, DEPT. OF GEOLOGY
UNIVERSITY STATION
LARAMIE, WY
307-766-2330
PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION -RANN)
GAYLORD ELLIS, GRANTS OFFICER
WASHINGTON, DC 20550
SECONDARY SPONSORS:
UNIV. OF WYOMING
PRIMARY FUNDING AMOUNT:
29,277
SECONDARY FUNDING AMOUNTS:
2,568
TIME FRAME:
02 01 75 TO 07 31 76
LOCATION:
WY

ABSTRACT:
THE OBJECTIVE OF THE RESEARCH WILL BE TO TEST WHETHER REMOTE OBSERVATIONS OF AEOLIAN GEOMORPHOLOGIC FEATURES CAN BE USED TO EFFICIENTLY LOCATE FAVORABLE SITES FOR WIND ENERGY-CONVERSION SYSTEMS.
THE CLIMATIC DIRECTION, SPEED, AND FREQUENCY OF THE SURFACE WIND AT ALL EXISTING LOCAL AREA NATIONAL WEATHER SERVICE STATIONS WILL BE DETERMINED AS A FUNCTION OF SEASON AND TIME OF DAY. AN ESTIMATE OF THE GUSTINESS AT EACH STATION WILL ALSO BE MADE.
THESE CLIMATIC DATA WILL BE CORRELATED WITH AEOLIAN LANDFORMS AS INTERPRETED FROM EARTH RESOURCES SATELLITE DATA. INTERPRETATIONS OF AVAILABLE INTERMEDIATE AND HIGH-ALTITUDE AERIAL PHOTOGRAPHY WILL BE USED AS AN AID IN ESTABLISHING PROPER CORRELATIONS BETWEEN THE SATELLITE DATA AND THE GROUND-GATHERED INFORMATION.
REPORTS AND PUBLICATIONS:
J.D. MARWITZ: 'AN AIRFLOW CASE STUDY OVER THE SAN JUAN MOUNTAINS OF COLORADO.' JOURNAL OF APPLIED METEOROLOGY, 13(3), 1974.
J.D. MARWITZ: PROGRESS REPORT OF BLACK THUNDER PROJECT ON CLIMATOLOGY. PROGRESS REPORT TO WYOMING ENVIRONMENTAL INST. BY DEPT. OF ATMOS. RES., UW, P.15, 1974.
R.W. MARRS: 'MULTIDISCIPLINARY STUDY OF WYOMING TEST SITES,' 4TH PROGRESS REPORT: DEPT. OF GEOLOGY, UW, AVAILABLE FROM NTIS, COLLEGE PARK, MD, 1974.
R.W. MARRS' 'ANALYSIS OF ERTS-1 IMAGERY OF WYO. AND ITS APPLICATION TO EVALUATION OF WYOMING:S NATURAL RESOURCES,' TYPE II REPORT: DEPT. OF GEOLOGY UW NASA TECHNICAL REPORT CR-12977, AVAILABLE FROM NTIS, COLLEGE PARK MD (RE. E 73-10037), 1973.

00000254
PROJECT TITLE:
COLOR INFRARED AERIAL PHOTOGRAPHY - GEOTHERMAL RESOURCE AREAS IN MONTANA AND WYOMING
PROJECT NUMBER:
1130-615-65
INVESTIGATORS:
JERALD STROEBELE; JOHN LLOYD
PROJECT SUPERVISOR:
JOHN G. WOOD
U.S. FISH AND WILDLIFE SERVICE
711 CENTRAL AVE.
BILLINGS, MT 59102
406-245-6711 A6115
PRIMARY SPONSOR:
U.S. FISH AND WILDLIFE SERVICE
PRIMARY FUNDING AMOUNT:
3,700
SECONDARY FUNDING AMOUNTS:
17,000 (INHOUSE)
TIME FRAME:
07 01 75 TO 09 30 76
LOCATION:
MT WY
ABSTRACT:
THE FISH AND WILDLIFE SERVICE OBTAINED 1:24,000 SCALE COLOR INFRARED PHOTOGRAPHY OF 1600 SQUARE MILES ON 7 AREAS IN MONTANA AND 2 AREAS IN WYOMING WHICH MAY BE IMPACTED BY DEVELOPMENT OF GEOTHERMAL RESOURCES. GROUND TRUTHING WAS COMPLETED DURING THE SUMMER OF 1975 FOR LATER INTERPRETATION OF THE IMAGERY ACCORDING TO HABITAT TYPES. U.S. FOREST SERVICE, REGION 1, MISSOULA, AND BUREAU OF LAND MANAGEMENT, MONTANA STATE OFFICE, BILLINGS, HAVE PURCHASED COPIES FOR THEIR USE.

00000255
PROJECT TITLE:
SOLAR ENERGY APPLICATION TO SEWAGE TREATMENT
INVESTIGATORS:
RICHARD L. PENDLETON' LELAND L. HARMS
PROJECT SUPERVISOR:
SOUTH DAKOTA SCHOOL OF MINES & TECH.
MECHANICAL ENGR. DEPT.
RAPID CITY, SD 57701
605-394-2448
PRIMARY SPONSOR:
SOUTH DAKOTA SCHOOL OF MINES & TECH.
PRIMARY FUNDING AMOUNT:
2,600
TIME FRAME:
06 20 75 TO 05 15 76
LOCATION:
SD
ABSTRACT:
IT IS PROPOSED TO APPLY THE PRINCIPLES OF SOLAR ENERGY COLLECTION TO AN URGENT NEED IN THE TREATMENT OF SEWAGE. THE SEWAGE TREATMENT IS NOT ONLY MORE EFFICIENT WHEN IT TAKES PLACE AT ABOUT 105 DEGREES F. BUT IN MANY INSTANCES THE TREATMENT IS NOT COMPLETE AND DOES NOT CONFORM TO FEDERAL STANDARDS WHEN IT TAKES PLACE AT LOW TEMPERATURES. IT IS BELIEVED THAT SOLAR ENERGY APPLIED TO THIS PROBLEM IS A NATURAL SOLUTION WITH VERY WIDE APPLICABILITY. AN ENGINEERING ANALYSIS OF THE OVERALL PROBLEM AND A FEASIBILITY STUDY WILL BE CONDUCTED ALONG WITH OPTIMIZATION OF CHARACTERISTIC PARAMETERS OF THE SYSTEMS INVESTIGATED.

00000256
PROJECT TITLE:
INELASTIC PROCESSES IN ATOMIC COLLISIONS
INVESTIGATORS:
M. E. RUDD; D. H. JAECKS; D. J. BURNS
RESEARCH FACILITY:
UNIV. OF NEBRASKA, DEPT. OF PHYSICS
LINCOLN, NE 68508
PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION
PRIMARY FUNDING AMOUNT:
1973 - 29,000
1974 - 86,000
1975 - 86,000
TIME FRAME:
09 01 73 - CONTINUING
LOCATION:
NE
ABSTRACT:

THIS IS A BROAD PROGRAM OF RESEARCH IN ATOMIC COLLISIONS WHICH IS BASIC TO DEVELOPMENT OF FUSION POWER AND ALSO TO STUDIES OF THE PHYSICAL PHASE OF RADIATION DAMAGE TO BIOLOGICAL TISSUES. WE MEASURE CROSS SECTIONS (I.E. PROBABILITIES) FOR IONIZATION OF VARIOUS ATOMS AND MOLECULES BY IMPACT OF ELECTRONS AND IONS OF MODERATE SPEED. WE ALSO STUDY THE SPECTRA OF ELECTRONS EJECTED IN SUCH COLLISIONS TO BETTER UNDERSTAND AUTOIONIZATION AND THE AUGER EFFECT. WE ALSO STUDY THE EXCITATION OF ATOMS AND MOLECULES IN ATOMIC AND ELECTRONIC COLLISIONS IN GASES AND IN THIN FOILS.

REPORTS AND PUBLICATIONS:

(1)M. E. RUDD, PHYS. REV. A10, 518 (1974); (2)M. E. RUDD AND J. H. MACEK, CASE STUDIES IN ATOMIC PHYSICS, VOL. 3, NO. 2 (1972); (3)D. H. CRANDALL AND D. H. JAECKS, PHYS. REV. A4, 2271 (1971); (4)P. J. MARTIN AND D. H. JAECKS, BERT, ET AL. JOUR. CHEM. PHYS. 59, 2641 (1973); (6)D. J. BURNS AND W. A HANCOCK, JOUR. OPTICAL SOC. AM. 63,241 (1973).

00000257
PROJECT TITLE:
BEDDED SALT PILOT PLANT
INVESTIGATORS:
A. L BOCH
RESEARCH FACILITY:
OAK RIDGE NATIONAL LABORATORY
P. O. BOX X
OAK RIDGE, TN 37830
PRIMARY SPONSOR:
U.S. ATOMIC ENERGY COMM., DIV. OF WASTE MANAGEMENT & TRANSP.
PRIMARY FUNDING AMOUNT:
1972 - 1,691,000
1973 - 1,475,000
1974 - 1,848,000
TIME FRAME:
01 01 57 - INDEFINITE
LOCATION:
NM SD TX MN KS OK TN
ABSTRACT:

THE PURPOSE OF THIS PROGRAM IS TO ESTABLISH A PILOT-PLANT REPOSITORY IN A BEDDED SALT FORMATION BY THE EARLY 1980'S IN ORDER TO DEMONSTRATE THE SUITABILITY OF SALT FOR DISPOSAL OF HIGH-LEVEL SOLIDIFIED WASTES FROM THE NUCLEAR POWER INDUSTRY. THESE WASTES REMAINED HAZARDOUS FOR HUNDREDS OF THOUSANDS OF YEARS,AND THERE IS AN INCREASINGLY URGENT NEED TO DEVELOP A MEANS FOR ISOLATING THEM PERMANENTLY OUTSIDE THE ENVIRONMENT UNDER CONDITIONS THAT REQUIRE MINIMAL SURVEILLANCE. FOLLOWING AN EXPERIMENTAL PROGRAM OF 5 TO 10 YEARS DURATION, WE WOULD HOPE THE RESULTS WOULD JUSTIFY THEN CONVERTING THIS PILOT PLANT TO A FULL-SCALE REPOSITORY THAT WOULD SATISFY THE NATION'S NEEDS FOR SEVERAL DECADES. THE PROGRAM IS DIVIDED INTO FOUR MAJOR INVESTIGATIVE TASKS. THEY ARE CONCERNED WITH THE EVALUATION OF THE GEOLOGICAL AND ENVIRONMENTAL CHARACTERISTICS OF POTENTIAL SITES SELECTED FOR THE PILOT PLANT; THE EFFECTS WHICH WASTE DISPOSAL OPERATIONS WILL HAVE ON SITE STABILITY AND LONG-TERM GEOLOGIC INTEGRITY; ASPECTS CONCERNED WITH THE SAFETY DURING OPERATION OF THE PILOT PLANT; AND WITH ENGINEERING DEVELOPMENT AND DESIGN OF THE PILOT PLANT.

REPORTS AND PUBLICATIONS:

(1)A. L. BOCH, ET AL. RADIOACTIVE WASTE REPOSITORY PROJECT ANNUAL PROGRESS REPORT FOR PERIOD ENDING SEPTEMBER 30, 1972. ORNL 4824 (DECEMBER 1972); (2)A. L BOCH, ET AL. RADIOACTIVE WASTE REPOSITORY PROJECT: TECHNICAL STATUS REPORT FOR PERIOD ENDING SEPTEMBER 30,1971. ORNL 4751 (DECEMBER, 1971); (3)R. L. BRADSHAW, W. C. MCCLAIN (ED.). PROJECT SALT VAULT: A DEMONSTRATION OF THE DISPOSAL OF HIGH ACTIVITY SOLIDIFIED WASTES IN UNDERGROUND SALT MINES. ORNL 4555 (APRIL, 1971).

00000258
PROJECT TITLE:
MANAGEMENT OF MOUNTAIN RANGELANDS WITH EMPHASIS ON ALPINE AND SUBALPINE TYPES
INVESTIGATORS:
J. F. THILENIUS
RESEARCH FACILITY:
U.S. FOREST SERVICE, FOREST & RANGE WATERSHED LAB.
LARAMIE, WY 82070
PRIMARY SPONSOR:
U.S. FOREST SERVICE
PRIMARY FUNDING AMOUNT:
1973 - 54,000
1974 - 65,000
1974 - 68,000
TIME FRAME:
01 01 73 - CONTINUING
LOCATION:
WY
ABSTRACT:

THE OBJECTIVE IS TO DEVELOP BASELINE ECOLOGICAL GUIDELINES EVALUATING THE ADEQUACY OF RESTORATION MEASURES ON SURFACE-MINED AREAS. STUDIES INCLUDE: A. DESCRIPTION OF PRESENT NATURAL CONDITIONS; B.ASSESSING LOSSES OR ALTERNATIVES TO PRESENT CONDITIONS FROM MINING ACTIVITIES; C.PROVIDING A BASIS FOR DIRECTING REHABILITATION AND SUBSEQUENT MANAGEMENT OF MINED AREAS; D.EVALUATING HISTORIC USES OF THESE AREAS FOR LIVESTOCK GRAZING; E.ASSESSING THE INHERENT VALUES OF THE AREAS IN WILDLIFE HABITAT; F. DETERMINING OPPORTUNITIES FOR RESOURCE VALUE ENHANCEMENTS.

REPORTS AND PUBLICATIONS:
J. F. THILENIUS, ET AL. 'EFFECT OF 2,4D ON COMPOSITION AND PRODUCTION OF AN ALPINE PLANT COMMUNITY IN WYOMING.' J. RANGE MANAGEMENT 27(2): 140-142.

00000259
PROJECT TITLE:
RECLAIMING COPPER MINED LANDS ON LYNX LAKE WATERSHED.
PROJECT NUMBER:
RM-1651 S CO A
INVESTIGATORS:
JOHN BEDELL
REGION 3
FEDERAL BUILDING
517 GOLD AVENUE SW
ALBUQUERQUE, NM 87101
DR. D. THORUD
UNIVERSITY OF ARIZONA
TUCSON, AZ 85721
COOPERATOR/COORDINATOR:
MR. FRED SHULTZ, PRIVATE LANDOWNER
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
45000
TIME FRAME:
12 30 74 TO 06 30 75
LOCATION:
AZ
ABSTRACT:

PROBLEM: PLAN AND IMPLEMENT DEMONSTRATION PROJECTS ON ABANDONED PROBLEM AREAS.

OBJECTIVES: REDUCE SILTATION AND TOXIC ELEMENTS FROM COPPER TAILINGS POND RUNOFF INTO LYNX LAKE.

METHODS: STABILIZE POND BY VEGETATION ESTABLISHMENT.

STATISTICAL ANALYSIS: N.A.

REPORTS AND PUBLICATIONS:
WORK PLAN: JUNE 15, 1974
REPORTS: PROGRESS REPORT QUARTERLY, FINAL REPORT, AND PUBLISHED ARTICLE.

00000260
PROJECT TITLE:
INFLUENCE OF SMALL MAMMALS IN THE REHABILITATION OF AREAS DISTURBED DURING OPEN PIT MINING.
PROJECT NUMBER:
RM-1711-17
PROJECT SUPERVISOR:
ARDELL J. BJUGSTAD
RM-1711
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY
RAPID CITY, SD 57701
COOPERATOR/COORDINATOR:
AMERICAN COLLOID CO.
WYOMING STATE LAND COMMISSION
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
28800
TIME FRAME:
06 01 74 TO 10 01 79
LOCATION:
WY
ABSTRACT:

PROBLEM: REHABILITATION OF BENTONITE MINE SPOILS NOW IS

A SLOW, ENERGY-CONSUMING PRACTICE WITH SUCCESS OFTEN ONLY PARTIAL. THIS APPEARS DUE TO SEALING OF SURFACE MATERIAL DURING RAIN CAUSING DROUGHTINESS OF THE SPOIL. MECHANICAL PRACTICES THAT WOULD INCREASE THE INFILTRATION AND PERMEABILITY OF THE SURFACE AND THE SPOIL REQUIRE CONSIDERABLE TRANSPORTED ENERGY AND IS OFTEN IMPRACTICAL. CONSEQUENTLY, THAT IS OFTEN NOT DONE.

OBJECTIVES: TO DETERMINE IF SMALL MAMMALS SUCH AS FIELD MICE, DEER MICE AND PRAIRIE DOGS ARE BENEFICIAL OR DETRIMENTAL TO THE REHABILITATION OF MINE SPOILS.

METHODS: EXCLOSURES AND ENCLOSURES OF ONE ACRE TO EXCLUDE OR INCLUDE SMALL MAMMALS WILL BE ESTABLISHED ON MINE SPOILS. SMALL MAMMAL POPULATIONS WILL BE MONITORED AND MAINTAINED AT A LEVEL CORRESPONDING TO UNDISTURBED SITE. MONITORING WILL BE BY USING THE SCHNABLE METHOD. PRAIRIE DOG ENCLOSURE, FIVE ACRES IN SIZE, WILL BE ESTABLISHED BY INTRODUCING PRAIRIE DOGS INTO THE ENCLOSURES. VEGETATION AND SPOIL PROFILE CHANGES WILL BE MEASURED ANNUALLY. THESE CHARACTERISTICS WILL INCLUDE PLANT SPECIES COMPOSITION, COVER, ANNUAL PRODUCTION AND LITTER, AND ALSO VARIOUS PROFILES IN THE SPOIL SUCH AS ORGANIC MATTER, NITROGEN, MOISTURE, AND SALT.

STATISTICAL ANALYSIS: TYPICAL ANOV TO EXPLAIN DIFFERENCES.

REPORTS AND PUBLICATIONS:
WORK PLAN: JULY 1974
REPORTS: ESTABLISHMENT: SEPTEMBER 1974
PROGRESS: SEPTEMBER 1975
INTERIM: OCTOBER 1976
FINAL: OCTOBER 1980

00000261

PROJECT TITLE:
SURVIVAL AND GROWTH OF SELECTED TREE AND SHRUB SPECIES ON BENTONITE MINE SPOILS NEAR COLONY, WYOMING, AND ASSOCIATED SPOILS CHARACTERISTICS.

PROJECT NUMBER:
RM-808

PROJECT SUPERVISOR:
HOWARD K. ORR, HYDROLOGIST
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECHNOLOGY
RAPID CITY, SD 57701

COOPERATOR/COORDINATOR:
AMERICAN COLLOID CO.
STATE OF WYOMING

PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468

PRIMARY FUNDING AMOUNT:
FY 74 - 5800

SECONDARY FUNDING AMOUNTS:
1000 PER YEAR FOR 3 YEARS

TIME FRAME:
05 01 74 TO 09 01 76

LOCATION:
WY

ABSTRACT:

PROBLEM: WHAT TREE AND SHRUB SPECIES CAN BE USED TO HELP STABILIZE BENTONITE MINE SPOILS AND BROADEN THE CHOICE OF OBJECTIVES OF REHABILITATION?

OBJECTIVES: TO DETERMINE ADAPTABILITY OF SELECTED SHRUB AND TREE SPECIES TO GROWING CONDITIONS ON BENTONITE SURFACE MINE SPOILS. TO DETERMINE SPOIL PHYSIOCHEMICAL PROPERTIES WHICH MAY RELATE TO TREE/SHRUB ADAPTABILITY AS COMPARED WITH NATURAL UNDISTURBED SOIL.

METHODS: A SINGLE ROW OF EACH OF 7 SPECIES IN EACH OF 5 BLOCKS, 45 PLANTS PER ROW, PLANTS 6 FEET APART, ROWS 8 FEET APART, BLOCKS 10 FEET APART. ALL PLANTS WILL BE CHECKED AT LEAST TWICE EACH YEAR (IN EARLY SUMMER AFTER GROWTH STARTS AND IN LATE FALL) FOR SURVIVAL AND GROWTH. SPECIES INCLUDED ARE GREEN ASH, RUSSIAN OLIVE, ROCKY MOUNTAIN JUNIPER, SILVER BUFFALOBERRY, PONDEROSA PINE, AMERICAN PLUM, AND SIBERIAN PEA SHRUB. SPOILS TO BE CORE AND BULK SAMPLED TO 54 INCHES FOR DETERMINATION OF PHYSIOCHEMICAL PROPERTIES AND VARIATION.

STATISTICAL ANALYSIS: ANOV AND ANOCV OF PLANTS AND SPOILS CHARACTERISTICS AND COMPARISON WITH NATURAL SOIL.

REPORTS AND PUBLICATIONS:
WORK PLAN: MAY 1974
REPORTS: ESTABLISHMENT AND PROGRESS: FALL 1974
PROGRESS FALL 1975
PROGRESS FALL 1976
FINAL WINTER 1976-1977

00000262

PROJECT TITLE:
TIME TREND CHANGES IN PHYSIOCHEMICAL PROPERTIES OF EMPLACED BENTONITE MINE SPOILS NEAR COLONY, WYOMING

PROJECT NUMBER:
RM-810

INVESTIGATORS:
HOWARD K. ORR, HYDROLOGIST
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECH.
RAPID CITY, SD 57701

PROJECT SUPERVISOR:
ARDELL J. BJUGSTAD
RM-1711
FOREST RESEARCH LAB.
SOUTH DAKOTA SCHOOL OF MINES & TECH.
RAPID CITY, SD 57701

COOPERATOR/COORDINATOR:
AMERICAN COLLOID CO.; STATE OF WYOMING; SOUTH DAKOTA SCHOOL

OF MINES & TECH.; SOUTH DAKOTA STATE UNIV.

PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468

PRIMARY FUNDING AMOUNT:
FY 75 76 77 78 - 4000 PER YEAR

TIME FRAME:
01 01 74 TO 12 30 78

LOCATION:
WY

ABSTRACT:

PROBLEM: DO PHYSIOCHEMICAL CHANGES TAKE PLACE IN BENTONITE MINE SPOILS AFTER EMPLACEMENT WHICH MAY DETER OR IMPROVE REHABILITATION POTENTIAL.

OBJECTIVES: TO DETERMINE IF THERE ARE PHYSIOCHEMICAL CHANGES IN BENTONITE MINE SPOIL UPON DIRECT EXPOSURE TO ATMOSPHERE WHICH MAY ALTER ITS STABILITY AND PLANT GROWTH POTENTIAL. IF UNDESIRABLE CHANGES OCCUR, HOW CAN THEY BE COUNTERACTED.

METHODS: SAMPLE REPRESENTATIVE AREAS OF EMPLACED MINE SPOILS AND ADJACENT UNDISTURBED AREAS. CORE AND BULK DENSITY SAMPLE TO 54 INCHES DEPTH SOON AFTER SPOIL EMPLACEMENT AND FINISH. SAMPLE AT ABOUT SAME TIME EACH YEAR FOR STUDY DURATION. SAMPLES WILL BE TESTED FOR STRUCTURAL AND CHEMICAL PROPERTIES.

STATISTICAL ANALYSIS: RESULTS WILL BE TESTED BY YEARS (ANOV) TO DETERMINE IF PHYSICAL OR CHEMICAL PROPERTIES HAVE OCCURRED WHICH MAY ENHANCE OR ADVERSELY AFFECT STABILITY AND PRODUCTIVITY POTENTIAL.

REPORTS AND PUBLICATIONS:
ESTABLISHMENT AND PROGRESS: SPRING 1975.
PROGRESS REPORT EACH YEAR. FINAL REPORT: 1978.

00000263

PROJECT TITLE:
EVALUATION OF SURFACE MINE REHABILITATION TECHNIQUES ON SOIL AND WATER CHARACTERISTICS WITHIN THE ROOTING ZONE.
COMMODITY: GOLD

PROJECT NUMBER:
INT-1605-SIH-12

INVESTIGATORS:
ROBERT S. JOHNSTON
INTERMTN. FOREST & RANGE EXP. STATION
FORESTRY SCIENCES LAB.
860 N. 12TH ST. EAST
LOGAN, UT 84321

PROJECT SUPERVISOR:
RAY W. BROWN (INT-1603)

COOPERATOR/COORDINATOR:
CUSTER NATIONAL FOREST; GALLATIN NATIONAL FOREST; KERR-MCGEE MINING CO.

PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468

PRIMARY FUNDING AMOUNT:
1974 - 15,000

SECONDARY FUNDING AMOUNTS:
1975 1976 1977 1978 - 5000 PER YEAR

TIME FRAME:
08 01 74 TO 09 30 78

LOCATION:
MT

ABSTRACT:

PROBLEM: SURFACE REHABILITATION AND REVEGETATION TECHNIQUES APPLICABLE FOR USE ON HIGH ELEVATION MINE SITES ARE VIRTUALLY UNEXPLORED. SUCCESSFUL REHABILITATION WILL DEPEND ON A BETTER UNDERSTANDING OF THE BASIC RELATIONSHIPS AND INTERACTIONS OF THE PLANT, SOIL AND WATER COMPLEX. THE INTERACTIONS OF SURFACE TREATMENTS AND REVEGETATION ON SOIL AND WATER QUALITY NEED TO BE INVESTIGATED.

OBJECTIVES: 1. EVALUATE THE CHEMICAL QUALITY OF SOIL AND SOIL WATER AS AFFECTED BY SEVERAL REHABILITATION TECHNIQUES.
2. DETERMINE PLANT RESPONSE TO SOIL AND WATER QUALITY CHANGES DUE TO TREATMENTS.
3. MEASURE AND DETERMINE SITE FACTORS WHICH MAY BE LIMITING TO PLANT GROWTH AND MAY BE AFFECTED BY SURFACE TREATMENTS, SUCH AS SOIL WATER STRESS AND SOIL TEMPERATURE.

METHODS: FIELD RESEARCH WILL BE CONDUCTED ON THE MCLAREN MINE NEAR COOKE CITY, MONTANA. THIS IS THE SITE OF AN EPA REHABILITATION DEMONSTRATION. FIELD DATA COLLECTION WILL INCLUDE SOIL AND WATER COLLECTIONS, ESTABLISHMENT OF REVEGETATION PLOTS AND IN-SITU PLANT-SOIL RELATIONS MEASUREMENTS.

STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE AND T-TEST.

REPORTS AND PUBLICATIONS:
STUDY PLAN: AUGUST 1974.
ANNUAL PROGRESS REPORTS AND PUBLICATIONS WILL FOLLOW PERIODICALLY.

00000264

PROJECT TITLE:
HYDRAULIC PLANTING AND MULCHING AS A REVEGETATION METHOD ON STEEP OVERBURDEN PILES.
COMMODITIES: COBALT, COPPER

PROJECT NUMBER:
SURFACE ENVIRONMENT AND MINING: INT-SIH-6

INVESTIGATORS:
BLAND Z. RICHARDSON; EUGENE E. FARMER

PROJECT SUPERVISOR:
R. E. PACKER

INTERMTN. FOREST & RANGE EXP. STATION
FORESTRY SCIENCES LAB.
860 N. 12TH EAST
LOGAN, UT 84321
COOPERATOR/COORDINATOR:
HANNA MINING CO.
SALMON NATIONAL FOREST
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
6000 PER YEAR
TIME FRAME:
10 01 73 TO 10 01 76
LOCATION:
ID
ABSTRACT:

PROBLEM: NUMEROUS SPOIL PILES EXCEED THAT SLOPE STEEPNESS WHICH WOULD ACCOMMODATE THE USE OF MACHINERY FOR THE APPLICATION OF SEED, MULCH, ETC. THESE SLOPES OFTEN EXCEED 100 PERCENT. THERE APPEAR TO BE ONLY TWO ALTERNATIVE METHODS OF REVEGETATING THESE STEEP SLOPES: (1) THEY MUST BE GRADED OUT TO A STEEPNESS THAT IS SAFE FOR THE OPERATION OF FARM-TYPE MACHINERY, OR (2) THEY MUST BE REVEGETATED IN-PLACE. IN MANY CASES THE FORMER IS A PHYSICAL IMPOSSIBILITY, WHEREAS HYDROMULCHING PROVIDES A POSSIBLE METHOD FOR ACCOMPLISHING THE LATTER.

OBJECTIVES: THE OBJECTIVES ARE: TO DETERMINE THE FEASIBILITY OF REVEGETATING OVERLY STEEP SLOPES WITH HYDROMULCHING TECHNIQUES AND METHODS, AND THAT CANNOT BE REVEGETATED BY CONVENTIONAL MEANS.

METHODS: EXCESSIVELY STEEP SLOPES ARE BEING CHEMICALLY TREATED TO NEUTRALIZE THEIR ACIDIC CONDITION, FOLLOWED BY APPLICATIONS OF SEED, MULCH, AND FERTILIZER. THESE TECHNIQUES ARE BEING APPLIED DURING THE FALL AND SPRING SEASONS.

RESULTS: DENSITY AND DRY-MATTER PRODUCTION OF PLANT MATERIALS WILL BE USED TO ASSESS THE FEASIBILITY OF THIS METHOD.

00000265
PROJECT TITLE:
RECLAMATION OF SURFACE AREAS AFFECTED BY MINING IN THE PACIFIC NORTHWEST.
PROJECT NUMBER:
INT-1603-SEM-5
INVESTIGATORS:
DR. RICHARD S. WHITE
COLLEGE OF FORESTRY, WILDLIFE AND RANGE SCIENCES
UNIVERSITY OF IDAHO
MOSCOW, ID 83843
PROJECT SUPERVISOR:
P. E. PACKER
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321
COOPERATOR/COORDINATOR:
UNIVERSITY OF IDAHO
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
57000
TIME FRAME:
01 01 74 TO 10 01 77
LOCATION:
ID
ABSTRACT:

PROBLEM: ONLY LIMITED RECLAMATION RESEARCH ON SURFACE MINE SPOILS HAS BEEN UNDERTAKEN IN THE WESTERN UNITED STATES. TO ELIMINATE THE DETRIMENTAL EFFECTS OF MINE SPOILS AND TAILINGS IN THE COEUR D'ALENE MINING DISTRICT OF NORTHERN IDAHO AND OTHER SIMILAR AREAS RESEARCH IS NEEDED TO DEVELOP METHODS AND SPECIES FOR REHABILITATING SPOIL MATERIALS FREQUENTLY LOADED WITH TOXIC LEVELS OF HEAVY METALS AND ACID.

OBJECTIVES: TO INVESTIGATE DIFFERENT PLANT RESPONSES ON SEVERAL KINDS OF MINE WASTE. TO EXAMINE AND EVALUATE DIFFERENT PLANTING TECHNIQUES AND METHODS. TO EVALUATE MECHANISMS BY WHICH PLANTS SURVIVE, GROW, AND REPRODUCE ON MINE SPOILS. TO APPLY RESULTS TO DEMONSTRATION PLOTS.

METHODS AND ANALYSES: FIELD PLOT TECHNIQUES, LABORATORY ANALYSES OF SPOILS AND BIOASSAYS OF SPOILS AND PLANTS IN GROWTH CHAMBERS AND GREENHOUSES.

REPORTS AND PUBLICATIONS:
WORK PLAN: JULY 15, 1974
PROGRESS: JUNE 1975, JUNE 1976
FINAL: OCTOBER 1, 1977

00000266
PROJECT TITLE:
THE EFFECT OF REVEGETATION ON ACID PRODUCTION WITHIN A MINE OVERBURDEN PILE.
COMMODITIES: COPPER, COBALT
PROJECT NUMBER:
SURFACE ENVIRONMENT AND MINING: INT-SIH-9
INVESTIGATORS:
EUGENE E. FARMER; BLAND Z. RICHARDSON

PROJECT SUPERVISOR:
PAUL PACKER
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321
COOPERATOR/COORDINATOR:
HANNA MINING CO.
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
8000 PER YEAR
TIME FRAME:
07 01 74 TO 07 01 78
LOCATION:
ID
ABSTRACT:

PROBLEM: THE EFFECTIVENESS OF A VEGETATIVE COVER IN MITIGATING ACID PRODUCTION IN SULPHIDE MINERAL MINING WASTES IS LARGELY UNKNOWN. IN PART THIS INFORMATION LACK IS DUE TO THE DIFFICULTY OF OBTAINING SOIL AND WATER SAMPLES NECESSARY FOR SUCH AN ASSESSMENT. SURFACE WATER SAMPLES ARE NOT ADEQUATE. WATER SAMPLES FROM WITHIN THE SATURATED AND UNSATURATED ZONES WILL BE REQUIRED.

OBJECTIVES:
1. TEST THE HYPOTHESIS THAT A HEAVY GRASS COVER WILL STOP ACID PRODUCTION IN A SULPHIDE MINERAL WASTE PILE.
2. IF ACID PRODUCTION IS SLOWLY DECREASED BY THE GRASS COVER, ASSESS THE TIMING OF ACID PRODUCTION CESSATION.

METHODS: UNSATURATED ZONE SOIL WATER SAMPLES WILL BE INSTALLED ALONG TWO LINE TRANSECTS SO THAT THE CROSS-SECTIONAL AREA OF THE WASTE PILE CAN BE SAMPLED. ONE LINE TRANSECT WILL BE HEAVILY REVEGETATED WITH GRASS. THE OTHER LINE TRANSECT WILL BE UNTREATED. WATER SAMPLES WILL BE ANALYZED FOR PH, ACIDITY, CU++, FE++, FE+++, SO4-.

00000267
PROJECT TITLE:
TESTING, EVALUATION AND DEMONSTRATION OF ENVIRONMENTALLY ACCEPTABLE PRIMARY EXPLORATION METHODS FOR MINERALS.
PROJECT NUMBER:
INT-1603-SEM-6
INVESTIGATORS:
EARL BENNETT
BUREAU OF MINES AND GEOLOGY
UNIVERSITY OF IDAHO
MOSCOW, ID 83843
PROJECT SUPERVISOR:
P. E. PACKER
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321
COOPERATOR/COORDINATOR:
UNIVERSITY OF IDAHO
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
32600
TIME FRAME:
07 15 74 TO 07 15 75
LOCATION:
ID
ABSTRACT:

PROBLEM: CURRENT METHODS OF EXPLORATION ARE FREQUENTLY DISTURBING AND DAMAGING TO ENVIRONMENTAL VALUES. METHODS OF PRIMARY EXPLORATION THAT PRODUCE MINIMUM ENVIRONMENTAL DISTURBANCE ARE NEEDED.

OBJECTIVES: TO TEST AND EVALUATE MODIFICATIONS OF PRIMARY EXPLORATION METHODS WITH A VIEW TOWARD DEVELOPING MORE JUDICIOUS AND EFFICIENT APPLICATION TO MINERAL EXPLORATION PROBLEMS.

METHODS AND ANALYSES: FOR REMOTE SENSING, SPACE IMAGERY, MIDDLE REMOTE, HIGH ALTITUDE VERTICAL AIR PHOTOGRAPHY, NEAR REMOTE, LOW ALTITUDE COLOR OBLIQUE STEREO AIR PHOTOGRAPHY WILL BE COMPARED FOR SENSING VARIOUS GEO-CHEMICAL AND GEOPHYSICAL PARAMETERS.

REPORTS AND PUBLICATIONS:
WORK PLAN: JULY 15, 1974
PROGRESS: NONE
FINAL: JUNE 15, 1975

00000268
PROJECT TITLE:
BLACKBIRD MINE ACID DRAINAGE PROBLEM.
COMMODITIES: COBALT, COPPER
PROJECT NUMBER:
INT-1603-SEM-7
INVESTIGATORS:
DALE ROLSTON
BUREAU OF MINES AND GEOLOGY
UNIVERSITY OF IDAHO
MOSCOW, ID 83843
PROJECT SUPERVISOR:
E. E. FARMER

INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321

COOPERATOR/COORDINATOR:
UNIVERSITY OF IDAHO

PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468

PRIMARY FUNDING AMOUNT:
23778

TIME FRAME:
07 15 74 TO 06 15 75

LOCATION:
ID

ABSTRACT:

PROBLEM: ACID WATER CONTAINING HEAVY METAL IONS AND OTHER POLLUTANTS ORIGINATING ON MINE PROPERTY IN BLACKBIRD CREEK, IDAHO, HAVE SERIOUSLY DAMAGED ESTHETIC QUALITIES OF THE ENVIRONMENT AND DAMAGED OR DESTROYED FISHERIES HABITATS FOR MANY MILES DOWNSTREAM TO THE MAIN SALMON RIVER.

OBJECTIVES: TO DEVELOP ALTERNATIVE MEASURES FOR REDUCTION OF ACID POLLUTION OF GROUND WATER EMANATING FROM MINE PORTALS OF THE BLACKBIRD MINE.

METHODS AND ANALYSES: TO SEEK OUT ENTRANCE WAYS OF SURFACE WATERS INTO MINE TUNNELS AND SHAFTS AND SEAL THEM OFF.

REPORTS AND PUBLICATIONS:
WORK PLAN: JULY 15, 1974
PROGRESS: FEBRUARY 15, 1975
FINAL: JUNE 15, 1975

00000269

PROJECT TITLE:
BENTONITE MINING RELATED RECLAMATION PROBLEMS IN THE NORTHWESTERN STATES

PROJECT NUMBER:
10570164

PROJECT SUPERVISOR:
C. C. MCCALL
MONTANA DEPT. OF STATE LANDS, CAPITOL STATION
HELENA, MT 59601
406-449-2074

PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
WILLIAM FOGARTY
PRATT BUILDING, SUITE 306A
BILLINGS, MT 59101
406-245- 6711 X6665

PRIMARY FUNDING AMOUNT:
85,915

TIME FRAME:
06 16 75 TO 10 30 77

LOCATION:
MT WY SD

ABSTRACT:

OBJECTIVE: TO FORMULATE PROCEDURES AND RECOMMENDATIONS REGARDING PROPER RECLAMATION OF BENTONITE SPOILS IN THE OLD WEST REGION. SPECIFIC TASKS: THE FOLLOWING TASKS ARE DESIGNED TO ACCOMPLISH THE ABOVE OVERALL OBJECTIVE: TASK 1 - DETERMINE BASIC PROBLEMS ASSOCIATED WITH BENTONITE RECLAMATION. THIS WILL INCLUDE ON SITE INVESTIGATIONS OF ACTIVE BENTONITE MINES IN THE REGION. SPOILS, VEGETATION, RECLAMATION METHODS AND CLIMATE WILL BE ANALYZED FOR SIMILARITIES AND DISSIMILARITIES AND FOR REASONS OF FAILURE OR SUCCESS OF RECLAMATION PRACTICES ON SPECIFIC SITES. TASK 2- SURVEY RECLAMATION LITERATURE AND DETERMINE WHAT DATA MIGHT BE APPLICABLE TO BENTONITE MINING RECLAMATION. RECLAMATION LITERATURE WILL BE SEARCHED AND EVALUATED IN SUCH FIELDS AS ROAD SIDE STABILIZATION, COAL AND BENTONITE MINE RECLAMATION ETC., FOR METHODS OF MATERIALS THAT MAY BE SUITABLE FOR EVALUATION ON BENTONITE SPOILS. TASK 3 - IDENTIFY GEOLOGIC BENTONITE DEPOSITS IN THE REGION AND ANALYZE SELECTED TEST AREAS. MAJOR BENTONITE DEPOSITS IN THE REGION WILL BE IDENTIFIED AND LOCATED ON A SUITABLE SCALE MAP OF THE REGION. TWO SITES WILL BE SELECTED IN AT LEAST TWO STATES FOR EXTENSIVE TESTING THAT WILL INCLUDE DATA GATHERING ON PHYSICAL AND CHEMICAL PROPERTIES OF THE SPOILS, AS THEY MAY AFFECT PLANT GROWTH, SOIL EROSIVITY, AND WATER QUALITY. TASK 4 - CORRELATE PREVIOUSLY GATHERED INFORMATION WITH SPECIFIC SITE DATA. THE DATA GATHERED IN TASKS 1, 2, AND 3 WILL BE CORRELATED AS A BASIS TO PROVIDE THE DESIGN FOR THE REVEGETATION AND RECLAMATION RESEARCH STUDIES TO BE IMPLEMENTED ON BENTONITE SPOILS. TASK 5 - SELECT SITES AND ESTABLISH RESEARCH PLOTS FOR TESTING RECLAMATION PROCEDURES AND MATERIALS. TWO SITES WILL BE SELECTED IN AT LEAST TWO OF THE STATES IN THE REGION FOR TESTING OF RECLAMATION PROCEDURES AND MATERIALS. THE FINAL PROJECT REPORT WILL MAKE RECOMMENDATIONS AS TO GUIDELINES FOR FEASIBLE RECLAMATION PRACTICES TO BE USED IN THE RECLAMATION OF BENTONITE SPOILS IN THE OLD WEST REGION.

REPORTS AND PUBLICATIONS:
FINAL REPORT, OCT. 30, 1977. AVAILABLE FROM THE OLD WEST REGIONAL COMMISSION.

00000270

PROJECT TITLE:
HUGHESVILLE, MONTANA, ACID MINE DEMONSTRATION PROJECT

PROJECT NUMBER:
S 603822-01

INVESTIGATORS:
MICHAEL R. BROWN

RICHARD L. BONDY
MONTANA DEPT. OF NATURAL RESOURCES AND CONSERVATION
32 S. EWING
HELENA, MT 59601

PRIMARY SPONSOR:
U.S. ENVIRONMENTAL PROTECTION AGENCY
JOHN F. MARTIN
NATIONAL ENVIRONMENTAL RESEARCH CENTER
CINCINNATI, OH 45268

PRIMARY FUNDING AMOUNT:
1975 - 106,887

TIME FRAME:
06 30 75 TO 02 01 78

ABSTRACT:

ACIDIC WATER DRAINING FROM THE GALENA CREEK MINE AREA HAVE ESENTIALLY DESTROYED THE AQUATIC LIFE IN ABOUT 24 KILOMETERS (15 MILES) OF THE DRY FORK OF BELT CREEK. THE PROJECT AREA IS LOCATED IN JUDITH BASIN AND CASCADE COUNTY, MONTANA. THE PROJECT AREA LIES IN THE UPPER BELT CREEK WATERSHED, 64 KILOMETERS (40 MILES) SOUTHEAST OF GREAT FALLS. THE PRIMARY OBJECTIVE OF THE PROJECT IS TO REDUCE THE ACIDIC CONCENTRATION IN THE WATERS OF GALENA CREEK AND THE DRY FORK OF BELT CREEK.

THE PROJECT WILL BE DIVIDED INTO FIVE DIFFERENT PHASES:

1. THE FIRST PHASE WILL BE THE SLOPING AND SEALING OF THE TOP OF THE BLOCK P MINE DUMP.

2. THE SECOND PHASE WILL INVOLVE RECHANNELING OF THE STREAMS AROUND MINE DUMPS IN SILVER CREEK AND GREEN CREEK.

3. THE THIRD PHASE WILL INVOLVE EXTENDING THE GALENA CREEK BYPASS PIPELINE UPSTREAM TO THE UPPER WIER.

4. THE FOURTH PHASE WILL BE A WATER QUALITY MONITORING PROGRAM ADMINISTERED BY THE MONTANA DEPARTMENT OF HEALTH AND ENVIRONMENTAL SCIENCES. THIRTY-TWO WATER SAMPLING STATIONS WILL BE SAMPLED.

5. THE LAST PHASE WILL INVOLVE A STREAMFLOW MEASUREMENT PROGRAM CONDUCTED BY THE DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION. FIVE STREAM GAGING STATIONS WILL BE OPERATED IN THE PROJECT AREA.

00000271

PROJECT TITLE:
DEVELOP LOW COST SYSTEM FOR RAPID IMAGE ANALYSIS AND TO APPLY THE VIDEO ENHANCEMENT CAPABILITY TO URANIUM EXPLORATION.

PROJECT SUPERVISOR:
RONALD W. MARRS
UNIV. OF WYOMING, DEPT. OF GEOLOGY
UNIVERSITY STATION
LARAMIE, WY 82071
307-766-2330

PRIMARY SPONSOR:
U.S. ENERGY RESEARCH & DEVELOPMENT ADMIN.
RESOURCE DIVISION
GRAND JUNCTION, CO 81501

SECONDARY SPONSORS:
UNIV. OF WYOMING

PRIMARY FUNDING AMOUNT:
52,630

SECONDARY FUNDING AMOUNTS:
22,800

TIME FRAME:
01 01 75 TO 12 31 76

LOCATION:
WY

ABSTRACT:

RESULTS FROM EVALUATIONS OF ERTS-1 (EARTH RESOURCES TECHNOLOGY SATELLITE) MULTISPECTRAL SCANNER DATA INDICATE A DEFINITE POTENTIAL FOR DIRECT IDENTIFICATION OF HYDROTHERMALLY ALTERED AND MINERALIZED AREAS THROUGH INTERPRETATION OF ENHANCED IMAGERY. THIS HAS BEEN ACCOMPLISHED THROUGH THE USE OF VERY SOPHISTICATED IMAGE ANALYSIS EQUIPMENT AND LITTLE POTENTIAL HAS BEEN REALIZED FROM THESE TECHNIQUES BECAUSE OF THE COST FACTORS.

THERE IS A NEED NOT ONLY TO TEST THE NEW ENHANCEMENT PROCEDURES AS A TOOL IN EXPLORATION FOR MINERALS, BUT ALSO TO DEVELOP A MORE ECONOMICAL MEANS OF PERFORMING COMPLEX IMAGE ANALYSIS.

THE PROPOSED RESEARCH PROGRAM INVOLVES CONSTRUCTION OF A LOW-COST VIDEO IMAGE-ANALYSIS SYSTEM WHICH CAN PROVIDE IMAGE ENHANCEMENT OF A TYPE AND QUALITY COM-

PARABLE TO PRESENT DIGITAL SYSTEMS. THE COMPLETED VIDEO IMAGE-ANALYSIS SYSTEM WILL BE EMPLOYED IN A STUDY OF SEVERAL AREAS OF KNOWN URANIUM MINERALIZATION TO DEFINE THE CAPABILITY OF THE SYSTEM AND THE APPLICABILITY OF IMAGE ENHANCEMENT TECHNIQUES TO URANIUM EXPLORATION. SUCCESSFUL PROCEDURES WILL THEN BE APPLIED TO SELECTED TEST AREAS FOR DELINEATION OF UNKNOWN AREAS OF URANIUM MINERALIZATION. THE COMPLETE SYSTEM, AS CONSTRUCTED BY SPATIAL DATA SYSTEMS, WOULD HAVE THE FOLLOWING CAPABILITIES: DENSITY ANALYSIS, AREA MEASUREMENT, EDGE ENHANCEMENT, BASE LEVEL ADJUSTMENT, GAIN CHANGE, BAND ADDITION, BAND INVERSION, BAND SUBTRACTION, BAND MULTIPLICATION, BAND RATIOING, ADDITION AND SUBTRACTION OF BAND COMBINATIONS. SELECTIVE USE OF THESE VARIOUS CAPABILITIES IN SEQUENCE ALLOWS ENHANCEMENT OF ALMOST ANY IMAGE FEATURE AND DELINEATION OF ANY FEATURES THAT ARE ORDINARILY UNRECOGNIZABLE. THE SYSTEM DOES NOT REQUIRE DIGITAL INPUT, SO IT IS EQUALLY EFFECTIVE WITH PHOTOGRAPHY OR IMAGERY.

THE UNIVERSITY OF WYOMING PRESENTLY HAS ON FILE COMPLETE ERTS-1 MULTISPECTRAL SCANNER COVERAGEOF WYOMING AND PORTIONS OF ADJACENT STATES. IN ADDITION, ALL AVAILABLE SKYLAB EREP DATA HAVE BEEN OBTAINED IN SUPPORT OF THE PRESENT EREP RESEARCH PROGRAM. THE UNIVERSITY REMOTE SENSING LAB ALSO HAS COLOR, COLOR INFRARED, AND/OR MULTIBAND AERIAL PHOTOGRAPHY COVERING APPROXIMATELY 70% OF WYOMING. THE MAJOR URANIUM DISTRICTS OF WYOMING WILL BE USED AS REFERENCE TEST AREAS. THE OVERALL TEST REGION WILL INCLUDE THE BLACK HILLS AND POWDER RIVER BASIN, THE WIND RIVER BASIN, SHIRLEY BASIN AND NORTHERN GREEN RIVER BASIN.

REPORTS AND PUBLICATIONS:

MARRS, RONALD W. AND R.S. HOUSTON, ´SOME EXAMPLES OF THE USE OF STANDARD DATA PRODUCTS OF THE NASA, ERTS, SKYLAB AND AIRCRAFT PROGRAMS IN THE STUDY OF WYOMING SURFACE RESOURCES; ´ROCKY MOUNTAIN SECTION OF THE AMER. ASSOC. OF PETROLEUM GEOLOGISTS, JUNE, 1974.

MARRS, RONALD W. AND R.S. HOUSTON, ´USE OF SKYLAB S-190A AND S-190B PHOTOGRAPHS IN WYOMING EARTH-RESOURCE STUDIES; ´20TH ANNUAL MEETING OF THE AMERICAN ASTRONAUTICAL SOCIETY, AUG. 20-22, 1974 (LOS ANGELES, CA).

0000272
PROJECT TITLE:
ENERGY REDUCTION THROUGH IMPROVED IRRIGATION PRACTICES
PROJECT NUMBER:
1057C001
INVESTIGATORS:
J. R. GILLEY 402-472-3307
PROJECT SUPERVISOR:
DR. W. E. SPLINTER
DEPARTMENT OF AGRICULTURAL ENGINEERING
UNIVERSITY OF NEBRASKA
LINCOLN, NE 68504
402-472-3307
COOPERATOR/COORDINATOR:
WATER RESOURCES INSTITUTE
WARREN VIESSMAN
212 AGRICULTURAL ENGINEERING BLDG.
UNIVERSITY OF NEBRASKA
LINCOLN, NE 68503
PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
WILLIAM FOGARTY
FRATT BLDG. 306A
BILLINGS, MT 59101
406-245-6711 X6665
PRIMARY FUNDING AMOUNT:
121,000
TIME FRAME:
06 01 74 TO 07 31 76
LOCATION:
NE
ABSTRACT:

THE OBJECTIVE OF THE PROJECT IS TO REDUCE BY 50% THE ENERGY REQUIRED FOR IRRIGATION BY SPRINKLER AND GRAVITY SYSTEMS. THIS WILL BE ACCOMPLISHED PRIMARILY THROUGH REFINEMENTS OF SCHEDULING PROCEDURES FOR CENTER-PIVOT IRRIGATION SYSTEMS ACCORDING TO PLANT DEMANDS AND WEATHER PATTERNS AND THROUGH DEVELOPMENT OF AUTOMATED GATED PIPE SYSTEMS THAT ARE PRACTICAL AND ECONOMICAL FOR ON-FARM USE.

0000273
PROJECT TITLE:
AUTOMATIC CONTROLS FOR COLD AIR HAY DRYING
INVESTIGATORS:
MYLO A. HELLICKSON; HARVEY G. YOUNG
PROJECT SUPERVISOR:
MYLO A. HELLICKSON
AG. EXP STATION, DEPT. OF AG. ENG.
SOUTH DAKOTA STATE UNIV.
BROOKINGS, SOUTH DAKOTA 57006
605-688-5141
PRIMARY SPONSOR:
SOUTH DAKOTA STATE UNIV., AG. EXP. STATION.
RAY MOORE
SECONDARY SPONSORS:
SIOUX VALLEY EMPIRE ELECTRIC ASSOC.
BERNIE SPEILMAN
COLMAN, SOUTH DAKOTA
605-534-3535
PRIMARY FUNDING AMOUNT:
14,300
SECONDARY FUNDING AMOUNTS:
1,050
TIME FRAME:
05 01 73 TO INDEFINITE
LOCATION:
SD
ABSTRACT:

COLD AIR DRYING OF LONG OR CHOPPED HAY PROVIDES ONE MEANS OF REDUCING FIELD AND HARVESTING LOSSES. IF ENERGY REQUIREMENTS CAN BE REDUCED, COLD AIR HAY DRYING WILL BECOME MORE ATTRACTIVE TO MANY FARMERS. THEREFORE, A RESEARCH PROJECT WAS INITIATED WITH THE FOLLOWING OBJECTIVES: 1. EVALUATION OF AUTOMATIC CONTROLS FOR MINIMIZING ENERGY REQUIREMENTS FOR COLD AIR HAY DRYING, 2. COMPARE THE QUALITY OF HAY DRIED USING SELECTED METHODS OF AIR FLOW CONTROL AND 3. COMPARE PERFORMANCE OF CONVENTIONAL COLD AIR HAY DRYING STYSTEMS AND SOLAR SUPPLEMENTED HAY DRYING SYSTEMS.

REPORTS AND PUBLICATIONS:
YOUNG, HARVEY G. AND MYLO A. HELLICKSON. "AUTOMATIC CONTROLS FOR COLD AIR HAY DRING." PROCEEDINGS OF INTERNATIONAL FEDERATION FOR AUTOMATIC CONTROLS SYMPOSIUM, SASKATOON, SASK., JUNE 18-20, 1974.

00000274
PROJECT TITLE:
ALTERNATIVES MODELS FOR SURFACE RESOURCES
INVESTIGATORS:
E. T. BARTLETT; D. A. JAMESON
PROJECT SUPERVISOR:
REGIONAL SYSTEMS PROGRAM
E. T. BARTLETT
325 AYLESWORTH HALL, COLORADO STATE UNIVERSITY
FORT COLLINS, CO 80521
303-491-5833
PRIMARY SPONSOR:
U.S. FOREST SERVICE - SURFACE ENVIRONMENT AND MINING
145 GRAND
BILLINGS, MT 59101
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
45,900
TIME FRAME:
06 17 74 TO 09 30 75
ABSTRACT:

THE PROPOSED EFFORT WILL ASSEMBLE DATA ON SURFACE RESOURCES OF 63 COUNTIES IN NORTH DAKOTA, SOUTH DAKOTA, MONTANA WYOMING, INTO A DATA BANK AND UTILIZE A SET OF ANALYTICAL PROCEDURES WHICH ALLOWS THE INVESTIGATION OF ALTERNATIVE LAND USES TO ACCOMPLISH MULTIPLE GOALS FOR EACH OF THE COUNTIES. THE RESULTANT PRODUCTS CAN BE USED FOR IMMEDIATE ASSESSMENT OF THE EFFECT OF THESE ALTERNATIVES ON THE GOALS, AND CAN ALSO BE USED FOR FUTURE EVALUATIONS AS INFORMATION AND GOALS CHANGE.

A MULTIPLE-FILE RETRIEVAL SYSTEM WILL BE UTILIZED TO RETRIEVE THE INFORMATION BY COUNTY DESIGNATION, ECOLOGICAL RESPONSE UNITS, MINING ALTERNATIVES, AND ENVIRONMENTAL AND ECONOMIC GOALS. THE DATA SYSTEMS USED WILL BE THOSE ALREADY DEVELOPED BY THE U.S. GOVERNMENT.

AN ALTERNATIVE SELECTION PROCEDURE KNOWN AS GOAL PROGRAMMING WILL BE UTILIZED TO ASSEMBLE THE INFORMATION INTO A FORM WHERE THE MULTIPLICITY OF INTERRELATED EFFECTS CAN BE JUDGED IN TERMS OF BOTH ECONOMIC AND ECOLOGICAL GOALS.

THE OBJECT OF THE PROPOSED WORK IS NOT TO MAKE SPECIFIC RECOMMENDATIONS FOR MANAGEMENT OF THE 63 COUNTY AREA, BUT TO PROVIDE A PROCEDURE TO ASSIST DECISION MAKERS IN DETERMINING THE EFFECT OF VARIOUS ALTERNATIVES IN TERMS OF ACHIEVEMENT TOWARD GOALS.

REPORTS AND PUBLICATIONS:
PROTOTYPE MODEL. 09 30 74; AUTOMATED MODEL. 06 30 75; FINAL REPORT. 09 30 75; INFORMATION FILE AND FILE DESIGN. 03 31 75; TABULAR DATA FILE. 12 31 74; MAP DATA FILE. 12 31 74.

00000275
PROJECT TITLE:
A SYSTEM FOR CLASSIFYING, INTERPRETING, AND UTILIZING ECOSYSTEMS INFORMATION FOR LAND MANAGEMENT, PLANNING AND DECISION MAKING
PROJECT NUMBER:
A - 4
INVESTIGATORS:
DR. LAWRENCE S. DAVIS, HEAD
DEPT. OF FORESTRY & OUTDOOR RECREATION
UTAH STATE UNIV.
LOGAN, UT 84322
801-752-4100 X7845
DR. JAN A. HENDERSON
COLLEGE OF NATURAL RESOURCES
UTAH STATE UNIV.
LOGAN, UT 84322
PROJECT SUPERVISOR:
DON T. NEBEKER, ASSOCIATE PROGRAM MANAGER
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
COOPERATOR/COORDINATOR:
COLLEGE OF NATURAL RESOURCES
UTAH STATE UNIV.
LOGAN, UT 84322
PRIMARY SPONSOR:
SURFACE ENVIRONMENT & MINING
PRIMARY FUNDING AMOUNT:
FY 75 - 68,820
FY 76 - 297,573
FY 77 - 138,573
TIME FRAME:
06 01 74 TO 09 30 77
LOCATION:
UT
ABSTRACT:

THERE IS A STRONGLY RECOGNIZED NEED AMONG MANY LAND MANAGERS FOR A SYSTEMATIC, INTEGRATED METHOD OF CLASSIFYING ECOLOGICAL COMPONENTS AS A BASIS FOR IMPROVED WILDLAND MANAGEMENT. AT PRESENT, EACH FUNCTIONAL DISCIPLINE CLASSIFIES LAND ACCORDING TO ITS OWN PARTICULAR SYSTEM. ALTHOUGH SOMETIMES ADEQUATE FOR CERTAIN FUNCTIONAL ACTIVITIES, CURRENT CLASSIFICATION SYSTEMS GENERALLY LACK COMMON ELEMENTS. AND, AS A RESULT, MANAGERS ARE OFTEN UNABLE TO INTER-RELATE MANAGEMENT PLANS AND ACTIVITIES.

OBJECTIVES: 1) TO DEVELOP (FINISH DEVELOPING) AN ECOLOGICALLY SOUND MODEL FOR ECOSYSTEM CLASSIFICATION WHICH TAKES INTO ACCOUNT THE VARIOUS ECOLOGICAL COMPONENTS. SUCH A MODEL SHOULD BE HIERARCHICAL, INTEGRATIVE AND ADAPTABLE TO MANAGEMENT INTERPRETATION. 2) TO PROVIDE A CONCEPTUAL

VEHICLE TO MAKE ECOLOGICAL INFORMATION AVAILABLE FOR EFFECTIVE LAND MANAGEMENT PLANNING AND DECISION MAKING IN AN APPROPRIATE FORMAT AND AT THE LEVEL OF RESOLUTION NEEDED.
SUBOBJECTIVES TO BE DEVELOPED: 1) A VEHICLE FOR TRANSFERRING MANAGEMENT, TREATMENT, LIMITATIONS AND OTHER INFORMATION ABOUT A SPECIFIC ECOSYSTEM TO SIMILAR ECOSYSTEMS. 2) A BASIS FOR COST-EFFECTIVENESS PLANNING OF ECOSYSTEM SURVEYS AND INVENTORIES TO ANSWER SPECIFIC PLANNING QUESTIONS. 3) A BASIC RATIONALE FOR INVENTORY OF VARIOUS KINDS OF ECOSYSTEM INFORMATION BY RELATING THE INVENTORY TO THE PLANNING QUESTION.
METHOD: FULFILLMENT OF THIS DEVELOPMENT EFFORT REQUIRES AN EXPLICIT RELATING OR INTERFACING OF THE ECOLOGICAL SYSTEM WITH THE MANAGEMENT SYSTEM. THAT IS, THE CLASSIFICATION AND COLLECTION OF INFORMATION ABOUT THE NATURAL ENVIRONMENT NEEDS TO RELATE TO THE PURPOSES FOR WHICH SUCH INFORMATION IS USED. THE COMPONENTS ARE AS FOLLOWS:
(P) THE ORGANIZATIONAL OR GOVERNMENTAL LEVEL OF LAND-USE PLANNING AND DECISION-MAKING. THESE ARE TYPICALLY LAND PLANNING OR MANAGEMENT UNITS DECREASING IN SIZE FROM THE WHOLE NATION TO THE SMALLEST SITE UNIT. HOWEVER, THE LEVEL IS DEFINED BY THE DECISION MAKING LEVEL AND NOT BY THE SIZE OF THE LAND UNIT. (Q) THE SET OF POLICY, PLANNING AND MANAGEMENT QUESTIONS FACED AT THE DIFFERENT PLANNING LEVELS WHICH REQUIRE ECOSYSTEM INFORMATION TO ANSWER. THESE QUESTIONS ARE TYPICALLY REPEATED AT EACH PLANNING LEVEL AND TYPICALLY BECOME MORE SPECIFIC AND DETAILED AT THE LOWER LEVELS OF PLANNING. (E) IS THE SYSTEM FOR HIERARCHIAL CLASSIFICATION OF ECOSYSTEM INFORMATION. THE RESOLUTION OR DETAIL INCREASES MOVING FROM ORDER 1 TO ORDER 5. AT PRESENT LANDS ARE CLASSIFIED BY SUCH SYSTEMS, AS LAND FORM SOMETIMES USED BY THE FOREST SERVICE, VEGETATION BY THE DAUBENMIRE SYSTEM, AND AQUATIC BY THE PLATT SYSTEM. THIS WILL TAKE INTO CONSIDERATION AND COORDINATE WITH THE WORK BEING DONE BY THILENIUS AT LARAMIE AND THE RECREATION AND AESTHETIC COMPONENT WILL FOLLOW THE WORK OF LITTON AT THE PACIFIC SOUTHWEST FOREST AND RANGE EXPERIMENT STATION. (I) REPRESENTS THE INTERACTIONS OF THE ECOSYSTEM COMPONENTS -THE WHOLE IS BIGGER THAN THE SUM OF ITS PARTS) AND THE INTEGRATED MANAGEMENT INTERPRETATIONS OF ECOSYSTEM CLASSIFICATIONS. IT IS SHOWN AS SOMEWHAT SEPARATE FROM BUT RELATED TO THE ECOLOGICAL CLASSIFICATION SYSTEM. THIS CONCEPT IS NOT YET WELL DEVELOPED BUT REPRESENTS THE INTEGRATION OF INFORMATION AT THE ECOSYSTEM CLASSIFICATION LEVEL.
(EQPI) REPRESENTS THE INTERFACE BETWEEN THE MANAGEMENT AND ECOLOGICAL SYSTEMS. THIS INTERFACE COULD BE CONCEIVED OF AS A MATRIX OF PRESCRIPTIONS FOR ECOSYSTEM INFORMATION REQUIRED TO ANSWER MANAGEMENT QUESTIONS AT THE DIFFERENT PLANNING LEVELS. THE NUMBERS SHOWN IN THE HYPOTHETICAL PRESCRIPTIONS OF FIGURE 1 REFER TO THE HIERARCHIAL LEVEL OF INFORMATION CLASSIFICATION IN THE ECOSYSTEM MODEL
USING THIS FRAMEWORK, THE TASK OF THIS STUDY WILL BE TO DEFINE A REPRESENTATIVE SET OF QUESTIONS (Q) AND SPECIFY THE INFORMATION NEEDED TO ANSWER THE QUESTION AT EACH PLANNING LEVEL. GIVEN THIS, THROUGH AN INTERACTIVE PROCESS THE ECOSYSTEM CLASSIFICATION SYSTEM WILL BE DEVELOPED, BUILDING ON EXISTING WORK AND CLASSIFICATION SYSTEMS BUT WITH SOME POSSIBLE EXPANSION, MODIFICATION AND ADAPTION. THE ECOSYSTEM CLASSIFICATION WILL BE BUILT KEEPING IN MIND THE END RESULT OF PREPARING THE INTERFACE MATRIX EQPI.

00000276
PROJECT TITLE:
MOSAIC - FSW GRANT 18
PROJECT NUMBER:
A - 2
INVESTIGATORS:
A. E. STEVENSON
THE AEROSPACE CORPORATION
P. O. BOX 92957
LOS ANGELES, CA 90009
PROJECT SUPERVISOR:
DR. GARY ELSNER, PROJECT LEADER
RECREATION & LANDSCAPE MANAGEMENT, PACIFIC SOUTHWEST
FOREST & RANGE EXPERIMENT STATION
1960 ADDISON ST, P. O. BOX 245
BERKELEY, CA 94401
COOPERATOR/COORDINATOR:
THE AEROSPACE CORPORATION
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X 6468
SECONDARY SPONSORS:
THE AEROSPACE CORPORATION
PRIMARY FUNDING AMOUNT:
112,000
SECONDARY FUNDING AMOUNTS:
120,000
TIME FRAME:
05 01 74 TO 05 01 76
LOCATION:
CA
ABSTRACT:
LANDSCAPE ARCHITECTS AND LAND MANAGERS ARE CONTINUOUSLY FACED WITH A NECESSITY FOR ASSESSING THE IMPACT OF VARIOUS LANDSCAPE ALTERATIONS BEFORE THEY ARE IMPLEMENTED AND IMPOSED ON EXISTING ECOSYSTEMS. IT IS DIFFICULT TO CONCEPTUALIZE ABSTRACT SITUATIONS BEFORE THE FACT. OFTEN ARTISTS CONCEPTIONS DO NOT ADEQUATELY PORTRAY SUCH IMPACTS ADEQUATELY. THEY ARE OFTEN TIME CONSUMING AND EXPENSIVE, THUS LIMITING THE PRACTICALITY OF LOOKING AT A WIDE ARRAY OF OPTIONS.

OBJECTIVES: TO DEVELOP A BASIS FOR A LOW COST TECHNIQUE WHICH CAN DISPLAY LANDSCAPE ALTERATIONS WITH REALISM USING THE COMPUTER TO PROVIDE A WIDE RANGE OF PERSPECTIVE DISPLAYS OF LANDSCAPE ALTERATIONS FOR OVERLAY ON A PHOTOGRAPH.
RESEARCH: TO EXAMINE THE LITERATURE FOR EXISTING TECHNIQUES, TO SURVEY SPECIFIC SEAM RELATED DISPLAY REQUIREMENTS, AND TO DETERMINE THE CAPABILITIES OF THE FOREST SERVICE HARDWARE AND SOFTWARE FOR POSSIBLE FUTURE APPLICATION OF A MOSAIC OPERATIONAL SYSTEM.
EXPERIMENTATION AND DEMONSTRATION: TO FORMULATE AND TEST METHODS OF ACHIEVING HIGH QUALITY LOW COST PHOTOMONTAGE DISPLAYS, USING POSTULATED FUEL BREAK DESIGNS IN THE SANTA YNEZ MOUNTAIN RANGE.
CONCEPTUAL DESIGN: TO DEFINE THE BASIC MODULES FOR AN OPERATIONAL MOSAIC/PHOTOMONTAGE SYSTEM. THE MODULES INCLUDE DATA COLLECTION AND PREPARATION, COMPUTATION, AND DISPLAY PREPARATION OPTIONS.

REPORTS AND PUBLICATIONS:
MOSAIC/PHOTOMONTAGE, FEBRUARY 1, 1975.

00000277

PROJECT TITLE:
DEMONSTRATION OF A DIGITIZING AND COMPOSITING PROGRAM FOR NATURAL RESOURCE DATA

PROJECT NUMBER:
10570169

PROJECT SUPERVISOR:
R. THOMAS DUNDAS
DEPT. OF COMMUNITY AFFAIRS, CAPITOL STATION
HELENA, MT 59601
406-449-2896

PRIMARY SPONSOR:
OLD WEST REGIONAL COMMISSION
WILLIAM FOGARTY
PRATT BUILDING, SUITE 306A
BILLINGS, MT 59101
406-245-6711 X6665

PRIMARY FUNDING AMOUNT:
69,910

TIME FRAME:
06 23 75 TO 06 30 76

LOCATION:
MT ND

ABSTRACT:
THE PRIMARY OBJECTIVE OF THIS PROJECT IS TO DEMONSTRATE THE CAPABILITIES OF A DIGITIZING AND COMPOSITING PROGRAM FOR NATURAL RESOURCE DATA. THE PROGRAM WILL INCLUDE: 1. OBTAINING RESOURCE DATA FOR SOILS, VEGETATION-HABITAT AND WILDLIFE FOR SAMPLE AREAS OF MONTANA AND NORTH DAKOTA -THE SOUTHERN PORTION OF ROSEBUD COUNTY IS DESIGNATED FOR MONTANA). 2. DIGITIZE BASE MAP FEATURES FOR NORTH DAKOTA AND MONTANA AREAS SELECTED FOR STUDY. 3. DIGITIZE MODERN SOIL CONSERVATION SERVICE SOIL SURVEY DATA. 4. DIGITIZE VEGETATION-HABITAT DATA. 5. DIGITIZE WILDLIFE DISTRIBUTION AND CRITICAL AREA DATA FOR THE SELECTED PROJECT AREAS. 6. OBTAIN AND DIGITIZE RECREATION SITE AND LAND OWNERSHIP DATA AS AVAILABLE FOR THE MONTANA AREA ONLY. 7. OVERLAY MAPS OF THE FOLLOWING TYPES WILL BE OUTPUTTED FROM THE SYSTEM FOR THE SELECTED AREAS IN AT LEAST TWO DIFFERENT SCALES: A. BASE MAPS WITH DIGITIZED FEATURES. B. SOIL SURVEY DATA. C. VEGETATION-HABITAT DATA. D. WILDLIFE DISTRIBUTION AND CRITICAL AREA DATA. E. RECREATION SITE AND LAND OWNERSHIP DATA FOR THE MONTANA AREA ONLY. 8. A DEMONSTRATION OF THE CELLULAR COMPOSITING TECHNIQUE USING AT LEAST FOUR OF THE ABOVE LISTED VALUES WILL BE PROVIDED TO THE COMMISSION UPON COMPLETION OF THE STUDY. THIS PROJECT WILL DEMONSTRATE THE INTERPRETATIONS AND PARAMETERS THAT CAN BE ANALYZED FROM THIS TYPE OF PROGRAM.

REPORTS AND PUBLICATIONS:
FINAL REPORT, MAPS. AVAILABLE FROM THE OLD WEST REGIONAL COMMISSION.

000000278

PROJECT TITLE:
THE INVENTORY AND DISTRIBUTION OF WATER AND ASSOCIATED LAND RESOURCES IN THE GARRISON/DEVILS LAKE REGION OF NORTH DAKOTA: AN APPLICATION OF RESOURCE DATA ACQUIRED BY ERTS

PROJECT NUMBER:
4577

INVESTIGATORS:
ROLAND D. MOWER

PROJECT SUPERVISOR:
ROBERT D. KOOB
NORTH DAKOTA STATE UNIV.
WATER RESOURCES RESEARCH INST.
FARGO, ND 58102
701-237-7765

COOPERATOR/COORDINATOR:
U.S. DEPT. OF INTERIOR
OFFICE OF WATER RESEARCH & TECHNOLOGY
WASHINGTON, DC 20240

PRIMARY SPONSOR:
U.S. DEPT. OF INTERIOR
WASHINGTON, DC 20240

PRIMARY FUNDING AMOUNT:
31,848

TIME FRAME:
05 15 75 TO 12 15 76

LOCATION:
ND

ABSTRACT:
RESEARCH OBJECTIVES:
1. TO DETERMINE THE FEASIBILITY OF MAPPING WATER AND ASSOCIATED LAND RESOURCES CATEGORIES FROM DATA ACQUIRED BY THE EARTH RESOURCES SATELLITE (ERTS) SUBSEQUENTLY RENAMED LANDSAT;

2. TO TEST THE VALIDITY OF WATER AND ASSOCIATED LAND RESOURCE CATEGORIES DEPICTED ON LAND USE MAPS PRODUCED USING VARIOUS AUTOMATED TECHNIQUES.

00000279

PROJECT TITLE:
SOIL LANDSCAPE CHARACTERISITCS AFFECTING LAND USE PLANNING AND RURAL DEVELOPMENT

PROJECT NUMBER:
ND H-15-032

INVESTIGATORS:
H.W. OMODT; D. D. PATTERSON
NORTH DAKOTA STATE UNIV., DEPT. OF SOILS
FARGO, ND 58102

PROJECT SUPERVISOR:
A. G. HAZEN
NORTH DAKOTA STATE UNIV., AG. EXP. STATION
FARGO, ND 581-2

PRIMARY SPONSOR:
NORTH DAKOTA STATE UNIV., AG. EXP. STATION

PRIMARY FUNDING AMOUNT:
FY 75 - 12,160

TIME FRAME:
01 01 73 TO 06 30 76

LOCATION:
ND

ABSTRACT:
THE OBJECTIVE IS TO DEVELOP AND PUBLISH SOIL LANDSCAPE GUIDES FOR LAND USE PLANNING AND RURAL DEVELOPMENT. THE APPROACH IS TO INVOLVE REPRESENTATIVES FROM TWO OR MORE AGENCIES OR DISCIPLINES IN THE PLANNING, EXECUTION, AND ANALYSIS. IT WILL ATTEMPT TO DEVELOP INTERPRETIVE MATERIALS FOR SOME OF THE NEWER AUDIENCES AND POTENTIAL USERS OF THE SOIL LANDSCAPE ANALYSIS AND TO DEVELOP GENERALIZED MAPS OF VARYING SCALES. GUIDES FOR RURAL LAND ASSESSMENT AND COUNTY OR TOWNSHIP EQUALIZATION PROCEDURES ARE BEING CONSTRUCTED. AN ULTIMATE GOAL IS TO DEVELOP A REGIONAL LAND RESOURCE MAP AND DATA BANK FROM WHICH CAN BE DERIVED SPECIFIC GUIDES IN TABULAR OR GRAPHIC FORM FOR ALTERNATE LAND USE PLANNING AND MANAGEMENT.

00000280

PROJECT TITLE:
NORTH DAKOTA RESOURCE INVENTORY AND MONITORING SYSTEM

PROJECT NUMBER:
ND 3336

INVESTIGATORS:
J.E. JOHNSON
NORTH DAKOTA STATE UNIV., DEPT OF AG. ECONOMICS
FARGO, ND 58102

PROJECT SUPERVISOR:
A. G. HAZEN
NORTH DAKOTA AG. EXP. STATION
FARGO, ND 58102

PRIMARY FUNDING AMOUNT:
1975 - 11,874

TIME FRAME:
07 01 73 TO 06 30 78

LOCATION:
ND

ABSTRACT:
TO DETERMINE INFORMATION REQUIRED BY RESOURCE DECISION

MAKERS; TO DEVELOP AND DEMONSTRATE A PILOT COMPUTERIZED INVENTORY FOR A SMALL GEOGRAPHIC AREA; TO COLLECT REQUIRED INFORMATION ON A STATEWIDE BASIS; TO OPERATIONALIZE THE INVENTORY SYSTEM ON A STATEWIDE BASIS; TO DEVELOP UPDATING PROCEDURES FOR THE INVENTORY SYSTEM. THE INITIAL PHASE INVOLVES CONSULTATION WITH POTENTIAL USERS AND DATA SUPPLIERS ON DATA NEEDS, USES AND AVAILABILITIES AND ESTABLISHING DATA CLASSIFICATION BY WHICH TO INPUT DATA. WORK WILL INCLUDE DEVELOPMENT OF COMPUTER PROGRAMS TO INPUT DATA, TO MANIPULATE DATA TO USERS' DESIRED OUTPUTS, PREPARATION OF SECURITY CODES, AND SIGNED INTERMEDIATE INTERPRETED OUTPUTS OF SELECT DATA PLUS UPDATING TECHNIQUES. DATA AND COMPUTER PROGRAMS WILL BE TESTED FOR A SPECIFIC GEOGRAPHICAL AREA. IN THE SECOND PHASE THE SYSTEM WILL BE EXPANDED TO A STATEWIDE BASIS AND PREPARED FOR STATE OPERATION AND SUPPORT.

00000281

PROJECT TITLE:
MERCER COUNTY STUDY AREA, NORTH DAKOTA LAND USE: MAY, 1975

INVESTIGATORS:
GARY E. JOHNSON
UNIV. OF NORTH DAKOTA, DEPT. OF GEOGRAPHY
GRAND FORKS, ND 58202
701-777-4246

PROJECT SUPERVISOR:
U.S. ERDA, ARGONNE NATIONAL LAB., ENERGY & ENV. SYSTEMS DIVISION

PRIMARY SPONSOR:
U.S. ERDA, ARGONNE NATIONAL LAB., ENERGY & ENVIRONMENTAL SYSTEMS DIV.
JAMES LAFEVERS
ARGONNE, IL 60439
312-739-7711

TIME FRAME:
03 04 75 TO 07 01 75

LOCATION:
ND

ABSTRACT:
A LAND USE INVENTORY OF SIX TOWNSHIPS IN MERCER CO., NORTH DAKOTA WAS CONDUCTED IN THE SPRING OF 1975 FOR THE PURPOSE OF IDENTIFYING LAND USE PRIOR TO THE IMPACT OF THE CONSTRUCTION OF A PROPOSED COAL GASIFICATION PLANT. NINE CATEGORIES OF LAND USE WERE IDENTIFIED AND MAPPED. A STATISTICAL SUMMARY OF ACRES AND PERCENTAGE OF AREA DEVOTED TO EACH LAND USE IN THE STUDY AREA WAS PREPARED. CATEGORIES OF LAND USE INDLUDED: 1. CULTIVATED 2. PASTURE AND OPEN 3. FORESTED 4. WATER 5. MARSH 6. EXTRACTIVE 7. TRANSPORTATION 8. URBAN RESIDENTIAL AND 9. URBAN NON-RESIDENTIAL AND MIXED RESIDENTIAL. THE INVENTORY WAS ACCOMPLISHED BY INTERPRETING BLACK AND WHITE PANCHROMATIC AND COLOR INFRARED AERIAL PHOTOGRAPHS ON A SCALE OF 1:24,000 TAKEN IN MAY OF 1975.

REPORTS AND PUBLICATIONS:
G. E. JOHNSON. "MERCER COUNTY STUDY AREA, NORTH DAKOTA LAND USE: MAY 1975." UNIV. OF NORTH DAKOTA, DEPT OF GEOGRAPHY, JULY, 1975. AVAILABLE FROM ARGONNE NATIONAL LAB.

00000282

PROJECT TITLE:
A CONTINUOUS REGIONAL LAND USE SURVEY SYSTEM UTILIZING A MODIFIED USGS CLASSIFICATION BASED ON REMOTE SENSING AND OTHER DATA.

INVESTIGATORS:
LAWRENCE M. OSTRESH; KARIN BOUTAIN

PROJECT SUPERVISOR:
U.S. NATIONAL AERONAUTICS & SPACE ADMIN.
400 MARYLAND AVE. SW
WASHINGTON, DC 20546
202-755-2320

COOPERATOR/COORDINATOR:
FEDERATION OF ROCKY MOUNTAIN STATES
GEORGE NEZ
2480 W. 26TH AVE.
DENVER, CO 80211

PRIMARY SPONSOR:
U.S. NATIONAL AERONAUTICS & SPACE ADMIN.

SECONDARY SPONSORS:
UNIV. OF WYOMING, GEOGRAPHY DEPT.
UNIV. STATION
LARAMIE, WY 82071

PRIMARY FUNDING AMOUNT:
10,500

SECONDARY FUNDING AMOUNTS:
4,080.84

TIME FRAME:
06 01 75 TO 06 31 76

LOCATION:
WY

ABSTRACT:

THE FEDERATION OF ROCKY MOUNTAIN STATES HAS RECEIVED A GRANT FROM THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION TO DEVELOP INTERSTATE COOPERATION IN THE UTILIZATION OF ERTS DATA AND TO ACTIVATE COMPATIBLE STATE AND FEDERAL SYSTEMS FOR SURVEYING AND ANALYZING LAND USE AND OTHER REGIONAL RESOURCES. A PORTION OF THIS GRANT IS TO BE SUBCONTRACTED TO A STATE LEAD AGENCY IN EACH OF THE SIX ROCKY MOUNTAIN STATES, WHOSE DUTIES ARE DESCRIBED BELOW. IN WYOMING, THE LEAD AGENCY IS THE GEOGRAPHY DEPARTMENT, UNIVERISITY OF WYOMING.

THE PRINCIPAL INVESTIGATOR WILL PERFORM THE DUTIES OF THE STATE LEAD AGENCY: IDENTIFY TARGET TRAINING SITES AND PROCURE ALL NEEDED GROUND TRUTH; SELECT FINAL LAND USE TESTING EXAMPLES FOR THE TEST SITES; SELECT GEOGRAPHIC QUADRANGLES AS TARGETS FOR FULL RANGE MAPPING PERFORMANCE OVERLAYS; DETERMINE ADDITIONAL DESIRED MULTI-PURPOSE MAPPING ANALYSES AND PROCURE DATA IN COMPUTER COMPATIBLE FORM TO BE USED IN CELLULAR COMPOSITE MAPPING; EVALUATE ALL OUTPUTS, PARTICIPATE IN REVIEW AND TRAINING SESSIONS; PARTICIPATE IN REPORT DEVELOPMENT; ACT AS LIASON FOR THE STATE WITH ALL OTHER PROJECT ELEMENTS.

00000263

PROJECT TITLE:
APPLYING SATELLITE AND AIRCRAFT IMAGERY TO LAND-USE, AND PHYSIOGRAPHIC MAPPING IN THE POWDER RIVER BASIN.

PROJECT SUPERVISOR:
RONALD W. MARRS
UNIV. OF WYOMING, DEPT. OF GEOLOGY
UNIVERSITY STATION
LARAMIE, WY 82071
307-766-2330

PRIMARY SPONSOR:
U.S. GEOLOGICAL SURVEY
ENVIRONMENTAL GEOLOGY BRANCH
BLDG. 45, FEDERAL CENTER
DENVER, COLORADO

PRIMARY FUNDING AMOUNT:
100,000

TIME FRAME:
01 01 75 TO 12 31 76

LOCATION:
WY

ABSTRACT:

THE PRIME OBJECTIVE OF THE PROPOSED STUDY IS TO APPLY SATELLITE AND AIRCRAFT IMAGERY TO LAND-USE AND PHYSIOGRAPHIC MAPPING IN THE POWDER RIVER BASIN OF NORTHEAST WYOMING. LAND-USE, VEGETATION, DRAINAGE AND LAND FORMS WILL BE INTERPRETED FROM COLOR, COLOR INFRARED AND AERIAL PHOTOGRAPHY, SKYLAB (EREP) PHOTOGRAPHY, AND ERTS IMAGERY. THE INTERPRETATIONS WILL BE CHECKED AGAINST PUBLISHED INFORMATION AND CHECKED IN THE FIELD.

THE STUDY AREA ENCOMPASSES ALL, OR PORTIONS OF EIGHT COUNTIES IN NORTHEAST WYOMING: CAMPBELL, CONVERSE, CROOK, JOHNSON, NATRONA, NIOBRARA, SHERIDAN, WESTON.

THE POWDER RIVER IS THE MAJOR DRAINAGE IN THE AREA WITH RANCHING AND DRY FARMING AS THE PRINCIPAL INDUSTRIES. THERE IS ALSO COAL, URANIUM AND BENTONITE PRODUCTION FROM OPEN CUT MINES AND SOME MAJOR OIL PRODUCTION.

THE GEOLOGY DEPARTMENT CURRENTLY HAS FOUR OTHER ACTIVE PROGRAMS INVOLVING REMOTE SENSING RESEARCH, TWO OF WHICH ARE INTERDISCIPLINARY PROGRAMS INCLUDING STUDIES OF GENERAL GEOLOGY, GEOMORPHOLOGY, HYDROLOGY, VEGETATION, AND RANGE-MANAGEMENT AS WELL AS LAND-USE.

AVAILABLE DATA INCLUDES COLOR, COLOR INFRARED AND MULTIBAND S-190-A PHOTOGRAPHY AS WELL AS PHOTOGRAPHY FROM THE S-190B CAMERA (SKYLAB). THERE ARE ALSO HIGH-ALTITUDE COLOR INFRARED PHOTOGRAPHS AND A GROWING LIBRARY OF RESEARCH DATA ON THE POWDER RIVER BASIN AREA. IN ADDITION, THE DEPARTMENT IS WELL EQUIPPED WITH INTERPRETATION EQUIPMENT AND IMAGE ENHANCEMENT APPARATUS, WITH PLANS TO IMPROVE THESE.

THE INVESTIGATIVE TEAM WILL EMPLOY SATELLITE AND AIRCRAFT DATA IN MAKING COMPOSITE INTERPRETATIONS OF LAND-USE, VEGETATION AND LAND-FORMS IN THE POWDER RIVER BASIN. THE INTERPRETATIONS OF THESE WILL BE COMPARED WITH PUBLISHED INFORMATION AND CHECKED IN THE FIELD TO DETERMINE THEIR RELATIVE RELIABILITY.

THE FINAL PRODUCTS OF POWDER RIVER BASIN MAPPING PROGRAM WILL CONSIST OF TOPICAL MAPS AND SUPPORTING TEXT. THE FINAL MAPS WILL BE DRAFTED TO A SCALE OF 1:250,000 ON A MYLAR BASE. SPECIFIC MAP PRODUCTS WILL INCLUDE: LAND-USE MAPS, VEGETATION MAPS AND LAND-FORM MAPS.

REPORTS AND PUBLICATIONS:

MARRS, R.W., 'REMOVE SENSING AIDS GEOLOGIC MAPPING;' PROCEEDINGS OF THE 8TH INTERNATIONAL SYMPOSIUM ON REMOTE SENSING OF THE ENVIRONMENT, UNIVERISITY OF MICHIGAN, OCT. 2-6, 1973

MARRS, R.W., R.M. BRECKENRIDGE AND D. J. MURPHY, 'REMOTE SENSING APPLIED TO LAND-USE STUDIES IN WYOMING;' SYMPOSIUM OF SIGNIFICANT RESULTS OBTAINED FROM ERTS-1, MARCH 5-9, 1973, NASA/GODDARD SPACE FLIGHT CENTER, GREENBELT, MD.

0000264

PROJECT TITLE:
IMPLEMENTATION OF MICRO - DENSITOMETER FOR PROCESSING REMOTE SENSED DATA

PROJECT SUPERVISOR:
D. NEIL ALLEN
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6468
COOPERATOR/COORDINATOR:
DIV. OF ENGINEERING
U.S. FOREST SERVICE, NORTHERN REG. OFFICE
MISSOULA, MT
PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT
406-245-6711 X6468
PRIMARY FUNDING AMOUNT:
25,000
TIME FRAME:
07 01 74 TO 12 31 75
LOCATION:
MT
ABSTRACT:

OBJECTIVE: TO DEVELOP WITHIN THE FOREST SERVICE THE TECHNOLOGY OF PROCESSING REMOTE SENSED DATA USING MICRODENSITOMETER SCANNER EQUIPMENT INTERFACED WITH COMPUTER SYSTEMS.

METHODS: A SPATIAL DATA SYSTEMS COLOR IMAGE ENHANCER/DIGITIZER IS BEING USED TO DEVELOP THE INHOUSE EXPERTISE FOR THE FOREST SERVICE IN PROCESSING REMOTE SENSED DATA FOR INTERPRETATION CLASSIFICATION STORAGE AND RETRIEVAL OF RESOURCE INFORMATION. THE SYSTEM CONSISTS OF A TELEVISION CAMERA, BLACK AND WHITE AND COLOR TV MONITORS, ANALYSER CHASSES AND DIGITIZER. IT HAS STAND ALONE CHARACTERISTICS AS WELL AS BEING INTERFACED WITH A NOVA 1200 MINICOMPUTER. THE NOVA 1200 HAS MAGNETIC DISK AND TAPE, IS PROGRAMMABLE IN ASSEMBLY AND FORTRAN LANGUAGES. DATA DIGITIZED BY THE DENSITOMETER IS PROCESSED THROUGH THE NOVA 1200, FORMATTED, AND WRITTEN ON MAGNETIC TAPE FOR INPUT TO COMLUP OR GELO.

00000285
PROJECT TITLE:
GRASSLAND AND SHRUBLAND PLANT COMMUNITY CLASSIFICATION IN EASTERN MONTANA
PROJECT SUPERVISOR:
JOHN E. TAYLOR
MONTANA STATE UNIV., DEPT. OF ANIMAL & RANGE SCIENCES
BOZEMAN, MT 59715
406-994-3721
PRIMARY SPONSOR:
U.S. FOREST SERVICE, SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711-X6468
PRIMARY FUNDING AMOUNT:
30,000
TIME FRAME:
03 01 75 TO 12 31 75
ABSTRACT:

THE MAJOR TERRESTRIAL ECOSYSTEMS IN THE ASHLAND DIVISION, CUSTER NATIONAL FOREST, HAVE BEEN MAPPED, BASED ON DELINEATIONS VISIBLE ON INFRARED COLOR AERIAL PHOTOGRAPHS. THIS PROJECT IS REFINING THAT CLASSIFICATION, AND COLLECTING RELATED DATA ON PLANT COMMUNITY STRUCTURE, PRODUCTIVITY AND POTENTIALS. THESE DATA WILL BE USED IN DEVELOPING A COMPUTER MODEL FOR LAND USE PLANNING RELATED TO ENERGY DEVELOPMENT ACTIVITIES ON THE DIVISION.

0000286
PROJECT TITLE:
SURFACE ENVIRONMENT AND MINING (SEAM)
INVESTIGATORS:
U.S. FOREST SERVICE - SEAM
RESEARCH FACILITY:
U.S. FOREST SERVICE - SURFACE ENVIRONMENT AND MINING
143 GRAND
BILLINGS, MT 59102
PRIMARY SPONSOR:
U.S. FOREST SERVICE
PRIMARY FUNDING AMOUNT:
1974 - 1,300,000
1975 - 1,350,000
TIME FRAME:
07 01 73 - CONTINUING
LOCATION:
WY MT NM UT ND ID
ABSTRACT:

SEAM IS A RESEARCH, DEVELOPMENT, AND APPLICATION PROGRAM DESIGNED TO PROVIDE LAND MANAGERS, THE MINING INDUSTRY, AND THE STATES WITH AN INNOVATIVE ARRAY OF ECONOMICAL PLANNING AND RECLAMATION ALTERNATIVES WHICH SATISFY BOTH ENVIRONMENTAL AND MINERAL NEEDS. IT IS AN ON-THE-GROUND PROBLEM-SOLVING EFFORT INITIALLY CONCENTRATED IN THE WEST WHERE LARGE-SCALE MINING OPERATIONS ARE ALREADY UNDERWAY OR ARE BEING PLANNED. THE OBJECTIVES FOR SEAM ARE: A. DETERMINE AND EVALUATE THE ENVIRONMENTAL IMPACTS OF MINING AND RELATED ACTIVITIES ON BOTH SITE AND ON SURROUNDING AREAS. IDENTIFY AND DISPLAY ALTERNATIVES. B. DETERMINE AND EVALUATE THE SOCIO-ECONOMIC IMPACTS OF MINING AND RELATED ACTIVITIES WITH EMPHASIS ON RURAL AREAS. IDENTIFY AND DISPLAY ALTERNATIVES. C. DEVELOP ALTERNATIVE ENGINEERING SYSTEMS WHICH INCLUDE WITHIN THEM THE BASIC RECLAMATION PRINCIPLES REQUIRED TO PREVENT OR REDUCE ENVIRONMENTAL DAMAGE. D. DEVELOP ALTERNATIVE LAND REHABILITATION TREATMENTS TO RETURN DISTURBED AREAS TO BENEFICIAL USE. E. DEVELOP ALTERNATIVE INSTITUTIONAL, LEGAL, SOCIO-ECONOMIC, AND PHYSICAL CRITERIA FOR USE IN COORDINATED PLANNING AND ADMINISTRATION OF MINERALIZED LANDS. F. SYNTHESIZE, TEST, AND EVALUATE ALTERNATIVE SYSTEMS AND PRACTICES ON DEMONSTRATION AREAS. PROVIDE LAND MANAGERS, INDUSTRY, AND REGULATORY AUTHORITIES WITH RECOMMENDATIONS NEEDED TO APPLY FINDINGS TO FUTURE AREA DEVELOPMENT. THE END PRODUCT OF SEAM WILL BE SEVERAL DEMONSTRATION AREAS WHERE NEW TECHNIQUES IN PRELIMINARY DESIGN OF MINING OPERATIONS, NEW METHODS OF REHABILITATION, NEW MINING TECHNOLOGIES, AND ENVIRONMENTAL STEWARDSHIP CRITERIA CAN BE SIMULTANEOUSLY EVALUATED AND DISPLAYED. THE PRELIMINARY PHASES OF THE SEAM PROGRAM HAVE BEEN STARTED IN WYOMING, MONTANA, NEW MEXICO AND UTAH. ADDITIONAL STUDIES AND PROJECTS ARE STUDYING THE ADAPTABILITY AND SUITABILITY OF A LARGE NUMBER OF GRASSES, FORB, SHRUB, AND TREE SPECIES TO SURFACE-MINED ENVIRONMENTS. VARIOUS SPOIL-BANK TREATMENTS SUCH AS TOPSOILING, FERTILIZING, MULCHING, AND WATERING ARE ALSO UNDER STUDY. A SUMMARY OF WHAT IS NOW KNOWN ABOUT THE REVEGETATION ASPECTS OF RECLAMATION IN THE NORTHERN GREAT PLAINS HAS BEEN ASSEMBLED. IN COOPERATION WITH STATES, THE MINING INDUSTRY, AND OTHER FEDERAL AGENCIES, DATA RETRIEVAL SYSTEMS AND A CLEARINGHOUSE ARE BEING DEVELOPED. INDUSTRY AND SEAM PERSONNEL ARE JOINTLY DEVELOPING GUIDELINES FOR LAND MANAGERS TO EVALUATE MINING PLANS. PRELIMINARY PLANS ARE BEING DEVELOPED FOR REVEGETATION AND STABILIZATION DEMONSTRATIONS.

0000287
PROJECT TITLE:
CHEMISTRY OF THE PYROLYSIS AND COMBUSTION OF CELLULOSIC MATERIALS
INVESTIGATORS:
F. SHAFIZADEH
RESEARCH FACILITY:
UNIV. OF MONTANA, DEPT. OF WOOD CHEMISTRY
MISSOULA, MT 59801
PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION, RANN
U.S. FOREST SERVICE
U.S. NATIONAL BUREAU OF STANDARDS
PRIMARY FUNDING AMOUNT:
1973 - 126,000
1974 - 116,000
TIME FRAME:
01 01 70 TO 01 01 77
ABSTRACT:

UNRAVELLING THE COMPLEX SERIES OF CONCURRENT AND CONSECUTIVE REACTIONS INVOLVED IN CONVERSION OF SOLID, NATURAL CELLULOSIC FUELS TO FLAMMABLE LIQUIDS AND GASES AND METHODS OF CONTROLLING THEM.

REPORTS AND PUBLICATIONS:

1)F. SHAFIZADEH. PYROLYSIS AND COMBUSTION OF CELLULOSIC MATERIALS. ADVAN, IN CARBOHYD. CHEM., 23, 419 (1968); 2) F. SHAFIZADEH AND G. D. MCGINNIS. CHEMICAL COMPOSITION AND THERMAL ANALYSIS OF COTTONWOOD, CARBOHYD. RES., 16, 273 (1971); 3)F. SHAFIZADEH. THERMAL BEHAVIOR OF CARBOHYDRATES. J. POLYMER SCI., PART C, 36, 21 (1971); 4) F. SHAFIZADEH AND Y. Z. LAI. THERMAL DEGRADATION OF 1,6-ANHYDRO-BETA-D-GLUCOPYRANOSE. J. ORG. CHEM., 37, 278 (1972); 5)F. SHAFIZADEH AND U. L. FU, PYROLYSIS OF CELLULOSE. CARBOHYD. RES., 29, 113 (1973); 6)F. SHAFIZADEH, CELLULOSE CHEMISTRY: PERSPECTIVE AND RETROSPECT. PURE AND APPL. CHEM., 35, 1[illegible]5, (1973).

00000288
PROJECT TITLE:
ASSESSMENT AND IMPLEMENTATION OF IN-STREAM VALUE STUDIES FOR THE NORTHERN GREAT PLAINS
INVESTIGATORS:
A. J. SILVERMAN; R. R. CURRY
RESEARCH FACILITY:
UNIV. OF MONTANA, DEPT. OF GEOLOGY
MISSOULA, MT 59801
PRIMARY SPONSOR:
U.S. ENVIRONMENTAL PROTECTION AGENCY
PRIMARY FUNDING AMOUNT:
1975 - 35,000
TIME FRAME:
06 06 74 TO 06 06 75
LOCATION:
MT
ABSTRACT:
THIS PROJECT INVOLVES THE FIELD TESTING AND VERIFICATION OF A METHODOLOGY FOR THE DETERMINATION OF "IN-STRESS VALUES" FOR THE NORTHERN GREAT PLAINS STATES DEVELOPED UNDER EPA CONTRACT 68-01-2413. THE PROPOSED METHODOLOGY IS BEING APPLIED TO THE TONGUE RIVER, A MAJOR TRIBUTARY OF THE YELLOWSTONE RIVER IN SOUTHEASTERN MONTANA.

00000289
PROJECT TITLE:
EVALUATION AND ASSESSMENT OF IN-STREAM VALUE STUDIES APPLICABLE TO THE NORTHERN GREAT PLAINS REGION
INVESTIGATORS:
A. J. SILVERMAN
RESEARCH FACILITY:
UNIV. OF MONTANA, DEPT. OF GEOLOGY
MISSOULA, MT 59801
PRIMARY SPONSOR:
U.S. ENVIRONMENTAL PROTECTION AGENCY
PRIMARY FUNDING AMOUNT:
1974 - 5,000
1975 - 5,000
TIME FRAME:
01 01 74 TO 08 01 74
LOCATION:
MT
ABSTRACT:
THIS PROJECT DEVELOPED A METHODOLOGY FOR THE RECOMMENDATION OF MINIMUM DISCHARGES FOR A WARM WATER FISHERY. THIS METHOD UTILIZES FIELD MEASUREMENTS OF CRITICAL STREAM AREAS AND BIOLOGICAL CRITERIA DETERMINED FROM THE USE OF INDICATOR SPECIES. INDICATOR SPECIES SUGGESTED INCLUDE THE PADDLEFISH (POLYODON SPATHULA), THE SAUGER (STIZOSTENDION CANADENSE), AND THE STONECAT (NOTORUS FLAVUS). A NUMBER OF VARIABLES WERE IDENTIFIED WHICH MIGHT REQUIRE A GREATER AMOUNT OF IN-STRESS FLOW THAN THE FISHERY, PER SE. THESE INCLUDE RIPARIAN VEGETATION, WATER QUALITY PARAMETERS, ANCHOR ICE FORMATION, AND THE RELATIONSHIP BETWEEN DISCHARGE AND SEDIMENT YIELD.
REPORTS AND PUBLICATIONS:
K. D. BOVEE. 'THE DETERMINATION, ASSESSMENT, AND DESIGN OF IN-STREAM VALUE STUDIES FOR THE NORTHERN GREAT PLAINS REGION.'

00000290
PROJECT TITLE:
SYNTHESIS AND PROPERTIES OF LIMITED-DIMENSIONALITY CONDUCTORS
INVESTIGATORS:
D. J. SELLMYER; G. A. GALLUP; C. J. ECKHARDT; G. D. STURGEON
RESEARCH FACILITY:
UNIV. OF NEBRASKA, DEPT. OF CHEMISTRY
UNIV. OF NEBRASKA, DEPT. OF PHYSICS
LINCOLN, NE 68508
PRIMARY SPONSOR:
NATIONAL SCIENCE FOUNDATION
UNIVERSITY OF NEBRASKA
PRIMARY FUNDING AMOUNT:
1975 - 80,000
TIME FRAME:
01 01 75 - CONTINUING
LOCATION:
NE
ABSTRACT:
THIS PROJECT IS AN EXPLORATORY INVESTIGATION OF SOME NEW CLASSES OF LINEAR ORGANIC CONDUCTORS. THE MATERIALS ARE OF INTEREST FOR THEIR POTENTIAL AS HIGH TEMPERATURE SUPERCONDUCTORS.

00000291
PROJECT TITLE:
DEVELOPMENT OF INSTRUMENTATION FOR THE IN SITU DETERMINATION OF PLANT WATER STATUS.
PROJECT NUMBER:
INT-SIH-3
INVESTIGATORS:
RAY W. BROWN
INTERMOUNTAIN FOREST & RANGE EXPERIMENT STATION
FORESTRY SCIENCES LABORATORY
860 NORTH 12TH EAST
LOGAN, UT 84321
PROJECT SUPERVISOR:
P. E. PACKER
INTERMOUNTAIN FOREST & RANGE EXP. STATION
FORESTRY SCIENCES LAB.

860 N. 12TH EAST
LOGAN, UT 84321

COOPERATOR/COORDINATOR:
FS-INT-1751

PRIMARY SPONSOR:
SURFACE ENVIRONMENT AND MINING
145 GRAND AVE.
BILLINGS, MT 59102
406-245-6711 X6466

PRIMARY FUNDING AMOUNT:
7500

TIME FRAME:
03 01 74 TO 03 01 75

LOCATION:
UT

ABSTRACT:

PROBLEM: THE DETERMINATION OF THE WATER STATUS OF PLANT TISSUES IS PRESENTLY POSSIBLE ONLY THROUGH DESTRUCTIVE SAMPLING TECHNIQUES. EVALUATION OF PLANT RESPONSES TO SURFACE MINE CONDITIONS REQUIRES IN SITU MONITORING OF PHYSIOLOGICAL PROCESSES SO THAT THE SAME PLANT TISSUES CAN BE STUDIED DURING THE GROWING SEASON.

OBJECTIVES: TO DEVELOP AN IN SITU LEAF THERMOCOUPLE PSYCHROMETER USING DOUBLE JUNCTION THERMOCOUPLE PSYCHROMETERS.

METHODS: THE TEMPERATURE AND VAPOR EQUILIBRIUM REQUIREMENTS OF VARIOUS MODELS WILL BE EVALUATED UNDER LABORATORY AND FIELD CONDITIONS USING VARIOUS PLANT SPECIES.

STATISTICAL ANALYSIS: ANALYSIS OF VARIANCE.

TYPE OF STUDY:
PRIMARY DATA/LAB. STUDY

REPORTS AND PUBLICATIONS:

REPORTS: PUBLICATION OF THE FINAL DESIGN WILL FOLLOW THE VARIOUS TESTING PROCEDURES.

00000292

PROJECT TITLE:
NORTH DAKOTA REGIONAL ENVIRONMENTAL ASSESSMENT PROGRAM (REAP)

PROJECT SUPERVISOR:
A. WILLIAM JOHNSON
STATE CAPITOL
NORTH DAKOTA REAP PROGRAM
BISMARCK, ND 58505
701-224-2916

PRIMARY SPONSOR:
NORTH DAKOTA-REAP
STATE CAPITOL
BISMARCK, ND 58505
701-224-2916

PRIMARY FUNDING AMOUNT:
2,000,000

TIME FRAME:
06 01 75 TO 06 30 77

ABSTRACT:

THE PURPOSE OF REAP IS TO ESTABLISH A RESEARCH EFFORT REGARDING NORTH DAKOTA'S RESOURCES IN ORDER TO PROVIDE INFORMATION TO GOVERNMENT AND THE PUBLIC TO AID IN THE DEVELOPMENT OF NEW LAWS, POLICIES, AND GOVERNMENTAL ACTIONS. FURTHER, SUCH INFORMATION SHOULD INDICATE THE ALTERNATIVES AVAILABLE TO THE STATE IN THE DEVELOPMENT OF RESOURCES, AND THE RESULTS AND IMPACTS OF SUCH DEVELOPMENTS, IN ORDER THAT ALTERNATIVES MAY BE SELECTED WHICH ENHANCE THE QUALITY OF LIFE OF THE CITIZENS OF THE STATE.

THE OBJECTIVES OF REAP ARE TO:
1. DEVELOP BASELINE DATA ON ENVIRONMENTAL, ECONOMIC, AND SOCIOLOGIC CHARACTERISTICS;
2. DEVELOP AN ASSESSMENT AND EVALUATION SYSTEM ABLE TO REACT TO ALTERNATIVE DEVELOPMENT PROPOSALS;
3. DEVELOP A CAPABILITY TO MONITOR FUTURE CHANGES, AND
4. DISSEMINATE INFORMATION.

THE PROGRAM WILL INVOLVE:
1. ACQUISITION OF BASELINE DATA,
2. DESIGN OF AN INFORMATION SYSTEM,
3. DESIGN OF AN ASSESSMENT SIMULATION/MODELLING SYSTEM,
4. ESTABLISHMENT OF A MONITORING SYSTEM, AND
5. RECOMMENDATION OF A SET OF EVNIRONMENTAL CONSTRAINTS AND OBJECTIVES.

00000293

PROJECT TITLE:
WYOMING ENERGY CONSUMPTION, MINERALS, FUELS, ELECTRICAL GENERATION AND AGRICULTURE

PROJECT NUMBER:
74-147

INVESTIGATORS:
THEODORE D. BROWNE; EDWARD F. HARVEY

PROJECT SUPERVISOR:
THEODORE D. BROWNE
BICKERT, BROWNE, CODDINGTON & ASSOCIATES, INC.
100 S. MADISON
DENVER, CO 80209
303-321-2547

COOPERATOR:
JOHN GOODIER
DEPT. OF ECONOMIC PLANNING & DEVELOPMENT
CAPITOL BUILDING
CHEYENNE, WY 82001
307-777-7284

PRIMARY SPONSOR:
PHILLIP D. BROOKS
OLD WEST REGIONAL COMMISSION
201 MAIN ST - SUITE D
RAPID CITY, SD 57701
605-348-6310

PRIMARY FUNDING AMOUNT:
20,000

TIME FRAME:
01 01 75 TO 06 30 75

LOCATION:
WY

ABSTRACT:

THE PURPOSE OF THIS RESEARCH PROJECT IS TO DETERMINE ENERGY CONSUMPTION REQUIRED BY WYOMING MINERAL OR FUEL PRODUCTION, ELECTRICITY GENERATION AND AGRICULTURE. ENERGY CONSUMPTION IS, AS RECOGNIZED BY BOTH THE SPONSOR AND BBC, A DIFFICULT AND COMPLEX TASK. IT AS ACKNOWLEDGED THAT DEFINITIVE ANSWERS HAVE NOT BEEN FOUND EVEN THOUGH THESE FINDINGS WERE SOUGHT.

THE INQUIRY IS FOCUSED UPON DIRECT ENERGY NEEDS WITHIN THE STATE OF WYOMING BOUNDARIES. INDIREC INFLUENCES WERE NOT CONSIDERED. FOR EXAMPLE, THE ENERGY USED TO PRODUCE THE STTEL IN A DOZER EMPLOYED IN A WYOMING COAL MINE WAS OUTSIDE THE STUDY SCOPE.

A 1969 DOCUMENT ENTITLED "REVIEW AND FORECAST -- WYOMING MINERAL INDUSTRIES" BY CAMERON ENGINEERS REPRESENTED AN ESPECIALLY HELPFUL SOURCE. ABOUT 60 PERSONAL INTERVIEWS WERE CONDUCTED WITH KNOWLEDGEABLE PERSONS AND AN ADDITIONAL 50 ORGANIZATIONS CONTRIBUTED INFORMATION BY CORRESPONDENCE OR THROUGH TELEPHONE INTERVIEWS.

TYPE OF STUDY:
PART OF WYOMING STATE INVESTMENT PLAN, DEPT. OF ECONOMIC PLANNING AND DEVELOPMENT.

REPORTS AND PUBLICATIONS:
T. BROWN, E. HARVEY. "WYOMING ENERGY CONSUMPTION." BICKERT, BROWNE, CODDINGTON & ASSOCIATES, INC. 1975

00000294

PROJECT TITLE:
SECONDARY ENERGY REQUIREMENTS FOR WYOMING

PROJECT NUMBER:
75-49

INVESTIGATORS:
EDWARD F. HARVEY; THEODORE D. BROWNE

8.0 OTHER

PROJECT SUPERVISOR:
EDWARD F. HARVEY
BICKERT, BROWNE, CODDINGTON & ASSOCIATES, INC.
100 S. MADISON
DENVER, CO 80209
303-321-2547

COOPERATOR/COORDINATOR:
JOHN GOODIER
WYOMING DEPT. OF ECONOMIC PLANNING AND DEVELOPMENT
CAPITOL BUILDING
CHEYENNE, WY 82001
307-777-7284

PRIMARY SPONSOR:
WYOMING DEPT OF ECONOMIC PLANNING AND DEVELOPMENT

SECONDARY SPONSOR:
FEDERAL ENERGY ADMINISTRATION

PRIMARY FUNDING AMOUNT:
16,000

TIME FRAME:
07 01 75 TO 11 30 75

LOCATION:
WY

ABSTRACT:

THREE PRIMARY OBJECTIVES OF THE RESEARCH EFFORT ARE: IDENTIFY EACH ENERGY CONSUMPTIVE ACTIVITY IN A COMMUNITY OR REGION WHICH MIGHT CHANGE AS A RESULT OF ESTABLISHING A MAJOR NEW MINERAL OPERATION;

ENERGY USE RELATED TO EACH OF THE ACTIVITIES IDENTIFIED ABOVE. THESE ESTIMATES SHOULD BE APPLICABLE TO ANY COMMUNITY OR REGION WITHIN THE STATE OF WYOMING LIKELY TO EXPERIENCE MAJOR MINERAL DEVELOPMENTS.

INCORPORATE SELECTED VARIABLES INTO A COMPUTER PROGRAM. PRIMARY AND SECONDARY ENERGY REQUIREMENTS FOR MAJOR MINERAL DEVELOPMENTS REPRESENT THE DESIRED OUTPUT.

000000295

PROJECT TITLE:
LAWS RELATING TO WILDLIFE AND ENERGY DEVELOPMENT

PROJECT SUPERVISOR:
ROBERT BECK
UNIV. OF NORTH DAKOTA, LAW SCHOOL
GRAND FORKS, ND 58202

PRIMARY SPONSOR:
US FISH AND WILDLIFE SERVICE
ROBERT STEWART
OFFICE OF BIOLOGICAL SERVICES
WASHINGTON, DC 20240
202-323-8095

PRIMARY FUNDING AMOUNT:
15,000

TIME FRAME:
07 01 75 TO 06 30 77

LOCATION:
CO MT ND SD WY

ABSTRACT:

COLLECT, ANALYZE AND COLLATE LAWS THAT PERTAIN TO WILDLIFE, WILDLIFE HABITAT AND ENERGY DEVELOPMENT IN COLORADO, MONTANA, NORTH DAKOTA, SOUTH DAKOTA, AND WYOMING.

0000297

PROJECT TITLE:
INPUT-OUTPUT PROJECT

INVESTIGATORS:
JERRY W. JOHNSON; LUTHER THOMPSON

PROJECT SUPERVISOR:
JERRY W. JOHNSON, PH. D.
DEPT. OF ECONOMICS
UNIV. OF SOUTH DAKOTA
VERMILLION, SD 57069
605-677-5319

ABSTRACT:

THE PURPOSE IS TO CONSTRUCT AN INPUT-OUTPUT MODEL TO PROVIDE A COMPREHENSIVE VIEW OF THE STRUCTURE OF THE STATE'S ECONOMY AS WELL AS PROVIDE AN ANALYTICAL TOOL FOR ANALYZING THE INTERDEPENDENCE BETWEEN THE SECTORS OF THE ECONOMY. THE OBJECTIVES INCLUDE: 1. ESTIMATE THE INTERINDUSTRY TRANSACTIONS, B. ESTIMATE THE DIRECT INPUT REQUIREMENTS OF EACH PRODUCING SECTOR FROM OTHER SECTORS OF THE ECONOMY, C. SOLVE THE RESULTING SYSTEM OF EQUATIONS DESCRIBING THE SOUTH DAKOTA ECONOMY, AND D. ANALYZE AND INTERPRET THE RESULTING OUTPUT FROM THE MODEL. ULTIMATELY, THE OBJECTIVE IS TO PROVIDE AN ECONOMIC MODEL TO BE USED AS A PLANNING TOOL AS WELL AS FOR THE PURPOSE OF MEASURING IMPACTS OF CHANGES IN ECONOMIC ACTIVITY RESULTING FROM SUCH SHOCKS AS ENERGY ABATEMENT, ETC. STANDARD INPUT-OUTPUT METHODOLOGY

AS DEVELOPED BY LEONTIEF WILL BE USED. BOTH PRIMARY AND SECONDARY DATA WILL BE USED TO MEET THE DATA NEEDS FOR THE MODEL.
REPORTS AND PUBLICATIONS:
ALL PUBLICATIONS FROM THE PROJECT WILL BE AVAILABLE THROUGH THE BUSINESS RESEARCH BUREAU, SCHOOL OF BUSINESS, UNIV. OF SOUTH DAKOTA.

00000298
PROJECT TITLE:
1974 WYOMING MINERAL YEARBOOK
INVESTIGATORS:
MARION E. LOOMIS
PROJECT SUPERVISOR:
JOHN T. GOODIER
WYOMING DEPT. OF ECONOMIC PLANNING & DEVELOPMENT, MINERALS DIV.
720 WEST 18 ST.
CHEYENNE, WY 82002
307-777-7284
PRIMARY SPONSOR:
WYOMING DEPT. OF ECONOMIC PLANNING & DEVELOPMENT
PRIMARY FUNDING AMOUNT:
1,500
TIME FRAME:
01 01 73 TO CONTINUING
LOCATION:
WY
ABSTRACT:
COMPILATION OF 1973 PRODUCTION BY COUNTY OF ALL IMPORTANT MINERALS INCLUDING PETROLEUM AND NATURAL GAS; PROJECTED PRODUCTION THROUGH 1978; AND A LISTING OF ASSESSED VALUATION FOR EACH COMMODITY BY COUNTY. A SHORT SECTION ON THE YEAR'S ACTIVITY IN EACH MINERAL IS INCLUDED.
REPORTS AND PUBLICATIONS:
1974 WYOMING MINERAL YEARBOOK, MARION E. LOOMIS, JOHN T. GOODIER, 1974, DEPARTMENT OF ECONOMIC PLANNING AND DEVELOPMENT, CHEYENNE, WY 82002. AVAILABLE FROM THE MINERAL DIVISION OF THE DEPARTMENT OF ECONOMIC PLANNING AND DEVELOPMENT. ANNUAL PUBLICATION.

00000299
PROJECT TITLE:
ENERGY RESOURCE MAP OF WYOMING
INVESTIGATORS:
WYOMING GEOLOGICAL SURVEY
PROJECT SUPERVISOR:
DANIEL N. MILLER, JR.
WYOMING GEOLOGICAL SURVEY
P.O. BOX 3008, UNIV. STATION, UNIV. OF WYOMING
LARAMIE, WY
307-742-2054
PRIMARY SPONSOR:
WYOMING GEOLOGICAL SURVEY
SECONDARY SPONSORS:
WYOMING DEPT. OF ECONOMIC PLANNING & DEVELOPMENT, MINERAL DIV.
JOHN T. GOODIER
720 WEST 18 ST.
CHEYENNE, WY 82002
307-777-7284
PRIMARY FUNDING AMOUNT:
4,500
TIME FRAME:
01 10 75 TO 03 01 75
STATUS:
COMPLETED 07 21 75
LOCATION:
WY
ABSTRACT:
THE ENERGY MAP SHOWS THE GEOLOGIC AGE OF AREAS IN THE STATE, LOCATION OF OIL, COAL FIELDS, AND URANIUM BEARING AREAS. ALL WORKING COAL MINES, OIL FIELDS, AND URANIUM MINING AND PROCESSING LOCATIONS ARE SHOWN. ALL OIL AND NATURAL GAS PIPELINES ARE INDICATED, LOCATION OF SECONDARY RECOVERY PROJECTS ARE SHOWN AND THE METHOD USED IS SPECIFIED. ALL REFINERIES AND NATURAL GAS PROCESSING PLANTS ARE SHOWN. ALL HYDROELECTRIC AND THERMAL ELECTRICAL GENERATING PLANTS ARE LOCATED. ALL PROPOSED MINES ARE PLACED. THE RANK OF COAL IS INDICATED FOR EACH FIELD.
REPORTS AND PUBLICATIONS:
G. B. GLASS, W. G. WENDELL, ET AL. 'ENERGY RESOURCES MAP OF WYOMING', MARCH, 1975, WYOMING STATE GEOLOGICAL SURVEY.

00000300
PROJECT TITLE:
WESTERN ENERGY TECHNOLOGY ASSESSMENT
INVESTIGATORS:
SCOTT LAGRONE
RADIAN CORP.
8500 SHOAL CREEK BLVD.
POST OFFICE BOX 9948
AUSTIN, TX 78766
512-454-4797
PROJECT SUPERVISOR:
IRVIN L. (JACK) WHITE; MICHAEL A. CHARTOCK
SCIENCE AND PUBLIC POLICY PROGRAM
601 ELM, ROOM 432
THE UNIV. OF OKLAHOMA
NORMAN, OK
405-325-2554
PRIMARY SPONSOR:
ENVIRONMENTAL PROTECTION AGENCY, OFFICE OF ENERGY

STEVE PLOTKIN
RD-6-92
401 M ST., SW
WASHINGTON, DC
202-755-0646

SECONDARY SPONSORS:

OTHER SPONSORS ARE: U.S. ERDA, CEQ, U.S. BLM, FEA, AND FPC

LOCATION:

WESTERN UNITED STATES (13 STATES)

ABSTRACT:

THE SCIENCE AND PUBLIC POLICY PROGRAM OF THE UNIVERSITY OF OKLAHOMA AND ITS SUBCONTRACTOR, THE RADIAN CORPORATION OF AUSTIN, TEXAS, ARE CONDUCTING A THREE-YEAR TECHNOLOGY ASSESSMENT OF COAL, OIL, NATURAL GAS, OIL SHALE, URANIUM, AND GEOTHERMAL RESOURCE DEVELOPMENT IN THE WESTERN UNITED STATES. TECHNOLOGY ASSESSMENT IS BEING DEVELOPED AS A POLICY-MAKING TOOL FOR SYSTEMATICALLY IDENTIFYING, DEFINING, AND EVALUATING THE FULL RANGE OF ECONOMIC, SOCIAL, ENVIRONMENTAL, INSTITUTIONAL, AND OTHER FIRST AND HIGHER ORDER CONSEQUENCES LIKELY TO RESULT FROM THE INTRODUCTION, EXTENSION, OR MODIFICATION OF TECHNOLOGIES. TAKING INTO ACCOUNT BOTH THE QUANTITATIVE AND QUALITATIVE COSTS, RISKS, AND BENEFITS OF EITHER A TECHNOLOGY OR ALTERNATIVE TECHNOLOGIES, ASSESSORS IDENTIFY, ANALYZE, EVALUATE, AND COMPARE ALTERNATIVE POLICIES AND IMPLEMENTATION STRATEGIES.

ALTHOUGH EPA'S WESTERN ENERGY TECHNOLOGY ASSESSMENT IS BEING CONDUCTED PRIMARILY TO INFORM EPA POLICIES MADE TO MEET ITS MAJOR ENVIRONMENTAL AND PUBLIC HEALTH RESPONSIBILITIES WITH REGARD TO THE DEVELOPMENT OF WESTERN ENERGY RESOURCES, THE RESULTS OF THE ASSESSMENT ARE EXPECTED TO BE USEFUL TO OTHER FEDERAL AGENCIES, STATE AND LOCAL GOVERNMENTS, AND INTERESTED INDIVIDUALS AND ORGANIZATIONS AS WELL.

MAJOR TASKS ENCOMPASS THE FOLLOWING CATEGORIES: 1. ENERGY RESOURCES. A STATE BY STATE DESCRIPTION OF EACH OF THE SIX RESOURCES INCLUDING: QUANTITY, CHARACTERISTICS, LOCATION, AND OWNERSHIP. 2. LAWS AND REGULATIONS. A DESCRIPTION OF THE FEDERAL AND STATE LAWS AND REGULATIONS THAT WILL APPLY TO ENERGY RESOURCE DEVELOPMENT IN THE REGION. DIFFERENCES AMONG DEVELOPMENTS ON FEDERAL, STATE, INDIAN, OR PRIVATE LANDS WILL BE DESCRIBED AS WILL DIFFERENCES WHICH OCCUR WHEN THE HOLDER OF THE MINERAL RIGHTS AND THE SURFACE OWNER ARE NOT THE SAME. 3. TECHNOLOGIES. THE DESCRIPTIONS OF TECHNOLOGIES IN 'ENERGY ALTERNATIVES' ARE TO BE BROUGHT UP-TO-DATE--MORE AND BETTER RESIDUALS DATA, ADDITIONAL TECHNOLOGICAL ALTERNATIVES, MORE ATTENTION TO PROCESS ENGINEERING, SECTIONS ON ENVIRONMENTAL CONTROL TECHNOLOGIES, ETC. 4. SCENARIOS. TWO KINDS OF SCENARIOS WILL BE USED: A) LOCAL SCENARIOS WHICH LOCATE A TECHNOLOGY OR STRING OF TECHNOLOGIES AT A SPECIFIC SITE, AND B) REGIONAL SCENARIOS WHICH RESPOND TO A REQUIREMENT TO PRODUCE A SPECIFIED AMOUNT OF ENERGY IN A GIVEN FUEL MIX AT SPECIFIED TIMES IN THE FUTURE. BOTH KINDS OF SCENARIOS ARE USED TO COMBINE TECHNOLOGIES AND AMBIENT CONDITIONS AT THE SITE WHERE THE TECHNOLOGIES ARE TO BE DEPLOYED. THIS WILL PROVIDE THE PRINCIPAL BASES FOR THE ANALYSIS OF IMPACTS. SITE-SPECIFIC DATA WILL BE REQUIRED IN THE CONSTRUCTION OF BOTH KINDS OF SCENARIOS.

TECHNIQUES. A VARIETY OF MODELS AND ANALYTICAL TECHNIQUES ARE TO BE USED IN THE ASSESSMENT INCLUDING POLLUTANT TRANSPORT MODELS, DECISION ANALYSIS, AND COST-RISK-BENEFIT TECHNIQUES. THESE MODELS AND TECHNIQUES ARE TO BE TESTED, REFINED, AND, WHERE APPROPRIATE, REPLACED.

REPORTS AND PUBLICATIONS:

ENERGY ALTERNATIVES: A COMPARATIVE ANALYSIS. NORMAN, OK, UNIV. OF OKLAHOMA, SCIENCE AND PUBLIC POLICY PROGRAM. MAY, 1975.

LOCATION INDEX

LOCATION INDEX

AZ

00000015 00000053 00000181 00000204 00000217 00000259 00000286 00000300

CA

00000038 00000211 00000235 00000243 00000276 00000300

CO

00000053 00000066 00000070 00000092 00000096 00000161 00000181 00000193 00000204 00000217 00000244
00000245 00000252 00000274 00000295 00000300

DC

00000218

GX*

00000037 00000039 00000040 00000043 00000081 00000154 00000190 00000195 00000198 00000224 00000291

ID

00000015 00000038 00000042 00000043 00000047 00000049 00000050 00000051 00000053 00000264 00000265
00000266 00000267 00000268 00000286 00000300

KS

00000257

KY

00000015

MD

00000015

MI

00000015

MN

00000257

MO

00000015

MT

00000001 00000007 00000008 00000009 00000010 00000012 00000015 00000036 00000038 00000042 00000044
00000045 00000046 00000047 00000048 00000049 00000050 00000051 00000053 00000054 00000059 00000066
00000067 00000071 00000072 00000074 00000076 00000077 00000078 00000079 00000080 00000086 00000089
00000091 00000092 00000094 00000095 00000097 00000098 00000099 00000100 00000101 00000102 00000104
00000110 00000113 00000114 00000115 00000120 00000121 00000122 00000123 00000124 00000125 00000126
00000127 00000128 00000129 00000134 00000135 00000136 00000146 00000149 00000150 00000152 00000153
00000154 00000155 00000156 00000157 00000158 00000162 00000163 00000164 00000165 00000166 00000167
00000168 00000169 00000170 00000171 00000172 00000173 00000174 00000175 00000176 00000177 00000178
00000179 00000180 00000181 00000184 00000185 00000186 00000187 00000190 00000193 00000194 00000195
00000197 00000198 00000201 00000204 00000205 00000206 00000207 00000208 00000209 00000211 00000223
00000225 00000227 00000229 00000247 00000248 00000254 00000263 00000269 00000270 00000274 00000277
00000284 00000285 00000286 00000287 00000288 00000289 00000295 00000296 00000300

*GX SIGNIFIES PROJECTS OF GENERAL APPLICABILITY NOT GEOGRAPHICALLY BOUND TO A STATE

```
ND
          00000001  00000007  00000009  00000011  00000013  00000014  00000016  00000017  00000018  00000019  00000020
          00000031  00000052  00000053  00000054  00000055  00000056  00000057  00000058  00000060  00000061  00000062
          00000065  00000066  00000073  00000081  00000082  00000083  00000084  00000085  00000091  00000092  00000093
          00000103  00000104  00000110  00000111  00000117  00000128  00000130  00000132  00000133  00000141  00000142
          00000145  00000146  00000156  00000181  00000189  00000190  00000191  00000192  00000194  00000195  00000196
          00000197  00000198  00000199  00000204  00000205  00000213  00000214  00000216  00000219  00000229  00000238
          00000274  00000277  00000278  00000279  00000280  00000281  00000286  00000292  00000295  00000296  00000300

NE
          00000190  00000195  00000198  00000265  00000256  00000272  00000290

NJ
          00000249

NM
          00000021  00000022  00000023  00000024  00000025  00000026  00000027  00000028  00000029  00000030  00000053
          00000066  00000188  00000257  00000286  00000300

NV
          00000300

NY
          00000015  00000136

OK
          00000212  00000217  00000235  00000239  00000243  00000257

OR
          00000015  00000300

PA
          00000210  00000217

SD
          00000001  00000002  00000003  00000004  00000007  00000012  00000053  00000075  00000087  00000092  00000104
          00000118  00000143  00000156  00000159  00000169  00000190  00000194  00000195  00000198  00000204  00000205
          00000210  00000217  00000218  00000221  00000222  00000250  00000251  00000255  00000257  00000269  00000273
          00000274  00000286  00000295  00000297  00000300

TN
          00000257

TX
          00000015  00000247  00000257

UT
          00000039  00000040  00000041  00000053  00000066  00000069  00000137  00000138  00000181  00000193  00000230
          00000246  00000252  00000275  00000286  00000291  00000300

WA
          00000015  00000224  00000247  00000300
```

WV

00000235 00000243

WY

00000005 00000006 00000007 00000008 00000009 00000012 00000032 00000033 00000034 00000035 00000036
00000053 00000054 00000063 00000064 00000066 00000068 00000073 00000087 00000088 00000090 00000091
00000092 00000097 00000104 00000105 00000106 00000107 00000108 00000109 00000110 00000112 00000116
00000119 00000128 00000131 00000137 00000138 00000139 00000140 00000143 00000144 00000146 00000147
00000148 00000160 00000169 00000181 00000182 00000183 00000190 00000193 00000195 00000197 00000198
00000200 00000202 00000203 00000204 00000205 00000209 00000211 00000212 00000215 00000217 00000220
00000226 00000228 00000229 00000230 00000231 00000232 00000233 00000234 00000235 00000236 00000237
00000239 00000240 00000241 00000242 00000243 00000244 00000245 00000246 00000249 00000252 00000253
00000254 00000258 00000260 00000261 00000262 00000269 00000271 00000274 00000282 00000283 00000286
00000293 00000294 00000295 00000296 00000298 00000299 00000300

PERSONAL
NAME
INDEX

PERSONAL NAME INDEX

ABEEG, T. 00000138
ALDON, E. F. 00000021 00000022 00000025 00000027 00000028 00000029 00000030 00000188
ALLEN, D. N. 00000264
ANDERSON, B. M. 00000229
ANDERSON, C. R. 00000078 00000173 00000175 00000176 00000177
ANDERSON, C.A. 00000127
ANDERSON, R. 00000086
ARCHER, V. S. 00000006
ARVANITIDIS, N. V. 00000198
ASPLUND, R. O. 00000006
BALL, J. S. 00000212 00000239
BAPTIST C. C. 00000235
BARDEN, R. E. 00000006 00000237
BARKER, L. K. 00000231
BARKER, R. E. 00000018
BARKER, W. T. 00000130
BARTLETT, E. T. 00000274

BAISCH, F.
00000009

BAKER, A.
00000011 00000060 00000061 00000062 00000082

BAKER, L. G.
00000221

BEAUCHAMP, H.
00000064

BECKERING, W.
00000133

BECK, R.
00000295

BEDELL, J.
00000259

BELIER, J. W. A.
00000214

BENNET, E.
00000267

BEREMAN, H.L.
00000160

BIESECKER, J.
00000070

BISHOP, E. F.
00000248

BISSELL, P. D.
00000003

BJUGSTAD, A. J.
00000031 00000032 00000033 00000034 00000035 00000036 00000091 00000142 00000260 00000262

BLACKBURN, K. A.
00000086 00000087 00000092 00000128 00000145 00000146 00000189

BLACKKETTER, D. O.
00000248

BLEVENS, A. L. 00000160 00000202

BLUESTEIN, A. 00000238

BOCH, A. L. 00000257

BONDY, R. L. 00000270

BOND, J. J. 00000014 00000016 00000018 00000020 00000052 00000054 00000055 00000056 00000057 00000058

BONER, F. C. 00000105

BORGMAN, L.E. 00000228

BOSSARD, M. 00000064

BOTZ, M. 00000113 00000114 00000157

BOUTAIN, K. 00000262

BOVEE, K. D. 00000115 00000289

BRANDENBURG, C. F. 00000215

BRANTHAVER, J. F. 00000238

BRECKENRIDGE, R.M. 00000263

BRIDGMON, G. H. 00000064 00000147

BROWNE, T. D. 00000293 00000294

BROWN, L. 00000224

BROWN, M. R. 00000270

BROWN, R. W. 00000040 00000045 00000047 00000049 00000051 00000263 00000291

BROWN, S. G. 00000201

BRUNK, D. 00000119

BUNGER, J. W. 00000234

BURNS, D. J. 00000256

BURWELL, E. L. 00000231

BUSLEE, C. 00000201

CAMERON, R. E. 00000073

CAMPBELL, G. G. 00000215

CAMPBELL, W. G. 00000197

CARAWAY, W. H. 00000235

CARLSON, C. E. 00000168 00000169

CARLSON, F. M. 00000212

CARPENTER, H. C. 00000236

CARROLL, R. E. 00000078 00000173 00000175 00000176 00000177

CARROLL, T. E. 00000196

CARTER, R. F. 00000001 00000073 00000156

CHALMERS, J. A. 00000181

CHARTOCK, M. A. 00000217 00000300

CHEN, C. S. 00000159

CHRISTIANSON, G. E. 00000145

CHRISTOPULOS, G. L. 00000087

CLACK, T. 00000206

CLEBSCH, JR., A. 00000092 00000155

CODDINGTON, D. C. 00000193 00000194

CODEY, S. A. 00000132

COGSWELL, T. E. 00000232

CONNOR, J. J. 00000229

COOLEY, A. M. 00000214

COOPER, W. A. 00000146

CORRIGALL, K. H. 00000124

COTTINGHAM, P. L. 00000231

COX, J. 00000148

CRANDALL, D. H. 00000256

CRCFT, M. G.
00000104

CRCSBY, O. A.
00000103

CLFPS, C. G.
00000230 00000235

CURRAN, G. F.
00000210

CURRY, R. R.
00000288

CLSHING, E. R.
00000092

DAVIS, B. L.
00000128 00000143

DAVIS, G.
00000168 00000179

DAVIS, L.S.
00000275

DECKEN, E.R.
00000252

DEFLIT, E. J.
00000129

DERR, W.E.
00000166 00000172

DINNEEN, G. L.
00000212 00000239 000000240 00000241

DIRPHIRN, I.
00000041

DCDD, J.L.
00000165 00000172

DCELL, R.
00000008

DOERING, E. J.
00000083

PERSONAL NAME INDEX

DORAN, D.	00000194	
DORRENCE, S. M.	00000234	
DREVER, J.I.	00000160	
DUFF, M. K.	00000193	00000194
DUNCAN, H. T.	00000003	
DUNCAN, W.	00000203	
DUNDAS, R. T.	00000277	
DUPREE, H. K.	00000067	
DWAN, T.	00000244	
DYER, A.	00000107	
DYER, P.	00000107	
EBENS, R. J.	00000229	
ECKHARDT, C. J.	00000290	
EDDLEMAN, L. E.	00000071	
ELLIOTT, R.	00000137	
ELLIS, C.	00000202	
ELLMAN, R. C.	00000132	00000214

PERSONAL NAME INDEX

ELSER, A. 00000095
ELSNER, G. 00000276
ERDMAN, J. A. 00000229
EVERSMAN, S. 00000172
FARLEY, R. D. 00000159
FARMER, E. E. 00000041 00000047 00000048 00000049 00000050 00000051 00000264 00000266 00000268
FAULKNER, L. 00000207
FALTIN, R.W. 00000160
FEDER, G. L. 00000229
FEGLEY, M. P. 00000132
FINCH, T. E. 00000225
FINK, C. E. 00000210
FISHER, S. 00000180
FISSER, H. G. 00000148
FISSER, R. 00000160
FOGARTY, W. 00000011 00000012 00000059 00000060 00000061 00000062 00000269 00000272 00000277
FOLLETT, R. F. 00000084

PERSONAL NAME INDEX

FOSTER, G.
00000250

FOWKES, W. E.
00000019

FOWKES, W. W.
00000013

FRAASE, R. G.
00000192

FRANKLIN, R. E.
00000071 00000072 00000073

FREEMAN, P. G.
00000013 00000019

FREUDENTHAL, D. D.
00000119

FRISCH, G.C.
00000160

FRIZZELL, E.
00000226

FROHNE, K. H.
00000212

FU, Y. L.
00000287

GAJESKI, E.
00000199

GALITZ, D. S.
00000130

GALLUP, G. A.
00000290

GARDNER, R. B.
00000223

GARVEY, R. G.
00000238

GATES, G. L.
00000235

GEE, G.
00000060 00000061 00000062

PERSONAL NAME INDEX

GILLEY, J. F. 00000060 00000061 00000062 00000272
GILMORE, J. S. 00000193 00000194
GLASS, G. B. 00000005 00000228 00000299
GLAZNER, J. 00000181
GLEASON, D. S. 00000216
GOLD, R. L. 00000187 00000206 00000209
GOODIER, J. T. 00000293 00000294 00000298
GORDON, C. C. 00000134 00000135 00000136 00000167 00000168 00000169 00000172 00000178 00000179
GORE, J. A. 00000115
GORIN, E. 00000210
GOUGH, L. P. 00000229
GRANDT, A. F. 00000069
GRAY, J. 00000188
GRIFFITHS, A. 00000075
GRONHOVD, G. H. 00000141 00000213 00000214 00000219
GRUBER, C. E. 00000222
HABLEY, R. 00000069 00000070 00000097
HAINES, W. E. 00000238

PERSONAL NAME INDEX

HAMILTON, J. A. R. 00000068

HANSHAW, B. B. 00000154

HARMS, L. L. 00000255

HARTHILL, M. 00000065

HARVEY, E. F. 00000293 00000294

HASFURTHER, V. 00000160

HAWKINS, R. W. 00000039

HAYEN, R. L. 00000202 00000203 00000204

HAZEN, A. G. 00000065 00000192 00000279

HELLICKSON, M. A. 00000250 00000273

HENDERSON, J. A. 00000275

HICKEY, J. 00000150

HIGGINS, H. G. 00000211

HIGGINS, R. V. 00000235

HILST, G. R. 00000152

HJELMFELDT, M. R. 00000159

HOOK, J. 00000193

PERSONAL NAME INDEX

HODDER, R. L. 00000076 00000077 00000089 00000129
HODSON, W. G. 00000092 00000109
HOLLAND, F. H. 00000226
HOOVER, L. J. 00000001
HOPKINS, W. E. 00000099
HOSKINS, E. 00000004
HOTCHKISS, W. R. 00000102
HOUGH, H. 00000063
HOWARD, M. 00000207
HURTUBISE, R. J. 00000006
IMHOFF, E. A. 00000154
JACQUOT, N.F. 00000002
JACQUOT, R. G. 00000244
JAECKS, D. H. 00000256
JAEGER, D. A. 00000237
JAMESON, D. A. 00000274

PERSONAL NAME INDEX

JENNINGS, J. W. 00000215

JENSEN, H. E. 00000236

JEWELL, D. W. 00000232

JOBES, P. 00000206

JOHANSEN, R. T. 00000235

JOHANSON, D. 00000069

JOHNSON, A. W. 00000292

JOHNSON, D. O. 00000156

JOHNSON, G. 00000024 00000026

JOHNSON, G. E. 00000281

JOHNSON, J. E. 00000280

JOHNSON, J. J. 00000297

JOHNSON, L. A. 00000212 00000230

JOHNSON, M. C. 00000185 00000186

JOHNSTON, R. S. 00000263

JONES, G. W. 00000131

JONTE, J. H. 00000222

PERSONAL NAME INDEX

JOSEPH, D.
00000163

KAHN, J. S.
00000211

KAFLIN, E. J.
00000140

KEECH, T. W.
00000212

KEISER, J.
00000113 00000114 00000157

KENNEY, F.
00000044

KERR, R. D.
00000144

KOLLMAN, A.
00000085

KOCH, R. D.
00000122 00000278

KORNBERG, H.
00000152

KUHLMAN, F. L.
00000066 00000067 00000068 00000069 00000070

KURZWEG, G. T.
00000256

LA GRONE, S.
00000161 00000300

LAEFIE, R. J.
00000174

LAFEVERS, J.
00000261

LAI, Y. Z.
00000287

PERSONAL NAME INDEX

LANDIS, E. 00000067 00000068 00000069

LAND, C. S. 00000212 00000230

LANE, C. W. 00000155

LANE, D.W. 00000228

LANG, R. L. 00000064 00000147

LATHAM, D. R. 00000232

LAUENROTH, W. K. 00000165

LEARY, P. 00000249

LECHTENBERG, G. L. 00000235

LEIGHTON, A. J. 00000235

LEISTRITZ, F. L. 00000192

LEONARD, R. L. 00000217

LEWIS, R. A. 00000170 00000172

LIJESEN, D. 00000198

LINDSEY, D. 00000027

LLOYD, J. 00000254

LOOMIS, M. E. 00000298

LOTT, P. F. 00000006

LOWHAM, H. K. 00000106

LOWRY, M. E. 00000108

LUKEN, W. 00000196

MACEK, J. H. 00000256

MACLAUGHLIN, R. S. 00000015

MADSEN, R. 00000124

MAIMONI, A. 00000211

MANCINI, A. J. 00000087

MANNING, B. 00000208

MARCHANT, L. C. 00000212 00000230

MARRS, R.W. 00000253 00000271 00000283

MARTIN, J. F. 00000270

MARTIN, P. J. 00000256

MARTIN, T. W. 00000225

MARTIN, W. 00000023 00000024 00000026

PERSONAL NAME INDEX

MARWITZ, J.C.
00000146 00000160 00000253

MALGHAN, D.
00000162 00000164

MAXFIELD, P.
00000200

MAXFIELD, W.
00000094

MAY, M.
00000064 00000139

MCCALL, C. C.
00000269

MCCOY, J.
00000070

MCGINNIS, G. D.
00000287

MCGREGOR, D. J.
00000118 00000251

MCKAY, J. F.
00000232

MCKAY, L. M.
00000224

MCNEAL, J. M.
00000229

MCNICE, G.T.
00000166

MCSFADDEN, W. R.
00000247

MCSPARRAN, D.
00000148

MCWHORTER, D. B.
00000096

MEISTER, K.
00000204

PERSONAL NAME INDEX

MELLGREN, D.
00000079

MEYN, R. L.
00000046

MILLER, D. L.
00000010

MILLER, D. N.
00000299

MILLER, S.G.
00000007

MILLER, W. R.
00000092 00000098 00000101

MINIER, A. E.
00000195 00000196 00000197 00000198 00000199 00000200 00000201

MONTEAU, R.
00000208

MOORE, D. F.
00000220

MOORE, R.
00000250 00000273

MOWAN, S.
00000011

MOTT, W.
00000156

MOWER, R. D.
00000278

MUMMEL, F. E.
00000012

MUNSHOWER, F. F.
00000129 00000167 00000178

MURPHY, D. J.
00000283

MURPHY, J. W. 00000006

NEBEKER, D. T. 00000275

NELSON, D. 00000115

NELMAN, D. R. 00000129

NEZ, G. 00000282

NODLAND, I. B. 00000199

NORTON, R. 00000202 00000203 00000204

NYREN, P. 00000082

OKADA, T. 00000238

OMODT, H. W. 00000279

ORR, H. K. 00000034 00000035 00000090 00000143 00000261 00000262

ORVILLE, H. D. 00000159

OSTRECH, L. M. 00000282

O'BRIEN, A. T. 00000238

O'TOOLE, J. J. 00000167 00000178

PAANANEN, O. 00000160

PACKER, P. E. 00000037 00000038 00000039 00000040 00000042 00000043 00000046 00000047 00000048 00000049 00000050 00000051 00000265 00000266 00000267 00000291

PAGENKOPF, G. K. 00000074

PAINTER, L. J. 00000064 00000139

PARIS, C.H. 00000160

PARKER, B.L. 00000007

PARKER, M. 00000160

PARRISH, L. 00000115

PASINI, J. 00000215 00000235

PATTERSON, D. D. 00000279

PALLSCH, L. E. 00000214

PAYNE, M. 00000113 00000114 00000157 00000162 00000164

PEAVY, H. 00000060

PENDLETON, R. L. 00000255

PERHAC, R. M. 00000152 00000153 00000154

PERKINS, R. W. 00000167 00000178

PERNICHELE, A. D. 00000224

PETERMAN, L. 00000095

PETERSON, L. 00000160

PETERSON, W. H. 00000250

PERSONAL NAME INDEX

PHILLIPS, R.
00000149

PHINNEY, R. A.
00000249

PIKE, G. M.
00000067 00000098 00000099 00000100 00000101 00000102 00000110 00000123 00000125 00000126

PLOTKIN, S.
00000300

POLZIN, P. E.
00000166

PORCELLA, D.
00000038

POTTER, D. W.
00000003

POTTER, K. R.
00000183

POULSON, R. E.
00000236

POWER, J. F.
00000014 00000017 00000020 00000052 00000053 00000054 00000055 00000056 00000057 00000058
00000061 00000081 00000082 00000083 00000084

POWE, R. E.
00000248

PRESTON, E.
00000172

PRESS, E. F.
00000252

PUESCHEL, R.F.
00000166

QUINCY, E. A.
00000220

RAHN, F. H.
00000012

RAMIREZ, J. M.
00000142

PERSONAL NAME INDEX

RANDALL, S.
00000188

RALZI, F.
00000064

RECHARD, P. A.
00000063 00000090 00000122

REDDEN, J. A.
00000222

REDDIN, L.
00000180

REED, J. C.
00000004

REICHMAN, G. A.
00000062

REICHMUTH, D. R.
00000227

REILLY, J. E.
00000195

RENNER, T.
00000189

RICCIARDELLI, P.
00000119

RICHARDSON, E. Z.
00000041 00000043 00000044 00000048 00000049 00000050 00000051 00000264 00000266

RIES, R. E.
00000017 00000052 00000053 00000061 00000084 00000160

RISLOVE, D. J.
00000239

ROBERTS, R. S.
00000100

ROBINSON, W.
00000233

ROLSTON, D.
00000268

ROMAN, R. J.
00000022

ROOT, F.K.
00000228

RUDD, M. E.
00000256

RUSSO, R.C.
00000121

SANDOVAL, F. M.
00000014 00000016 00000017 00000020 00000052 00000053 00000054 00000055 00000056 00000057 00000058
00000081 00000084

SANKS, R. L.
00000080

SCHACTERLE, D.
00000068

SCHEER, A. C.
00000227

SCHITOSKEY, F.
00000151

SCHMITZ, R. J.
00000222

SCHOLL, D. G.
00000029

SCHOON, R. A.
00000118 00000251

SCHNIDER, L. A.
00000215

SCHROER, F. W.
00000065

SCIUCHETTI, L.
00000221

SCOTT, J. J.
00000197

SCOTT, W. R.
00000103 00000104 00000110

SELLE, S. J.
00000133 00000213

PERSONAL NAME INDEX

SELLMYER, D. J. 00000240

SENECHAL, D. M. 00000192

SEVERSON, D. E. 00000216

SEVERSON, R. C. 00000229

SHAFIZADEH, F. 00000267

SHOWN, L. M. 00000097

SHLCA, L. Z. 00000212

SILVERMAN, A. J. 00000115 00000153 00000288 00000289

SILVERTHORN, J. H. 00000190

SIMMONS, J. 00000037

SINDELAR, B. W. 00000072 00000129

SINGLETON, F. C. 00000063 00000160

SKIDMORE, D. R. 00000216

SKOGERBOE, R. K. 00000096 00000121

SMIDT, B. 00000203 00000204

SMITHSON, S.B. 00000252

SMITH, H. 00000194

SMITH, J. W. 00000233

PERSONAL NAME INDEX

SMOYER, F. 00000266
SOHNS, H. W. 00000236
_ONDxEAL, E. A. 00000133 00000141 00000213 00000214
SOLEY, A. M. 00000216
SPEILMAN, B. 00000273
SPLINTER, W. E. 00000272
SPRENGER, L. 00000111 00000112 00000126 00000158
SPRINGFIELD, H. W. 00000023 00000024 00000026 00000028 00000029 00000030
STANTON, N.L. 00000160
STEPHENS, D. R. 00000211
STEVENSON, A. E. 00000276
STEWART, D. H. 00000247
STEWART, R. 00000149 00000150 00000151 00000295
STIMPSON, B. 00000224
STREEPER, S. 00000203
STREIDTMANN, J.R. 00000246
STROEBELE, J. 00000009 00000010 00000254

PERSONAL NAME INDEX

STUDER, J.
00000181 00000182 00000183 00000184 00000190 00000191

STURGEON, G. D.
00000290

SUDBURY, J. D.
00000210

SUGIHARA, J. M.
00000238

SURDAM, R.C.
00000245

SWENSON, F. A.
00000092

SWINEEROAD, J.
00000001

TAHA, F.
00000148

TATE, J.
00000160

TAYLOR, B. L.
00000006

TAYLOR, J.
00000172

TAYLOR, J. E.
00000170 00000171 00000285

THILENIUS, J. F.
00000144 00000256

THOEM, I.
00000074 00000116 00000117 00000120 00000123 00000161

THOMPSON, J. G.
00000202

THOMPSON, L.
00000297

THORUD, D.
00000259

THURSTON, R.V.
00000121

PERSONAL NAME INDEX

TIDBALL, R. R. 00000229
TOURANGEAU, P. C. 00000136
TOWNES, H. W. 00000248
TSAO, A. 00000134
TUFTE, P. H. 00000133 00000213
TUPA, G. 00000089
UTTER, M. F. 00000006
VAN VOAST, W. A. 00000059 00000127
VANDER MEULEN, A. 00000203 00000204
VEAL, D. L. 00000144
VIESSMAN, W. 00000272
WALI, M. K. 00000013 00000085
WARD, C. C. 00000238
WASSON, J. A. 00000212
WATTS, G. 00000202 00000203 00000204
WEAVER, T. 00000045
WENDELL, W. G. 00000299
WESCHE, T. A. 00000144

WESTRE, S.
00000226

WEST, S. W.
00000068 00000105 00000106 00000108 00000109 00000110

WHITE, I. L.
00000217 00000300

WHITE, R. S.
00000265

WHITMAN, W. C.
00000031 00000065 00000130

WICKS, G. J.
00000086 00000134

WILLEMS, D.
00000120

WILLIAMS, A. S.
00000207

WILLIAMS, D.
00000195

WILLIAMS, T.I.
00000122

WILLIS, W. C.
00000017 00000020 00000052 00000053 00000054 00000055 00000056 00000057 00000058 00000061 00000063

WOESSNER, W. W.
00000094

WOLFBAUER, C.A.
00000245

WOODMANSEE, R.
00000165

WOOD, J. G.
00000254

WRAY, J.L.
00000245

WRIGHT, C. F.
00000214

WU, G. Y. 00000238

YAMAMOTO, T. 00000036 00000091

YORK, M. N. 00000119

YOUNG, H. G. 00000273

ORGANIZATION
INDEX

ORGANIZATION INDEX

AEROMET
00000163

AEROSPACE CORPORATION
00000276

AMAX COAL CO.
00000031 00000032 00000033 00000034 00000035 00000090

AMERICAN COLLOID CO.
00000031 00000032 00000260 00000261 00000262

AMERICAN GAS ASSOCIATION
00000210 00000243

AMERICAN METAL CLIMAX FOUNDATION, INC.
00000036 00000049

AMERICAN PETROLEUM INSTITUTE
00000232 00000238 00000239

ATLANTIC-RICHFIELD CO.
00000036 00000148 00000160

BARNS & MCDONNELL
00000204

BASIN ELECTRIC POWER COOPERATIVE
00000083 00000084 00000142 00000202 00000203 00000204

BATTELLE PACIFIC NW LAB., PHYSICS & INSTRUMENTATION DEPT.
00000247

BICKERT, BROWNE, CODDINGTON & ASSOCIATES, INC.
00000293 00000294

BLACK HILLS POWER AND LIGHT CO.
00000036

BOISE INTERAGENCY FIRE CENTER
00000041

BOOZ, ALLEN & HAMILTON, INC.
00000195

BRIDGER COAL CO.
00000064

BROOKHAVEN NATIONAL LAB
00000136

BURNS & MCDONNELL
00000202 00000203

ORGANIZATION INDEX

CARTER MINING CO.
00000064

COLORADO STATE UNIV.
00000165 00000172

COLORADO STATE UNIV., CHEMISTRY DEPT.
00000096

COLORADO STATE UNIV., CIVIL ENG. DEPT.
00000010

COLORADO STATE UNIV., DEPT. OF AG. ENGINEERING
00000096

COLORADO STATE UNIV., NATURAL RESOURCE ECOL. LAB.
00000121

COLORADO STATE UNIV., REGIONAL SYSTEMS PROGRAM
00000274

CONOCO COAL DEVELOPMENT CO., RESEARCH DIV.
00000210

CONSOLIDATION COAL CO.
00000018 00000052 00000054 00000055 00000056 00000057 00000058 00000063 00000064 00000142 00000218
00000222

CROW TRIBE
00000155

DAMES & MOORE
00000224

DECKER COAL CO.
00000044 00000048 00000050 00000051

DENVER RESEARCH INSTITUTE
00000193 00000194

ECOLOGICAL CONSULTING SERVICE
00000078 00000173 00000175 00000176 00000177

ELECTRIC POWER RESEARCH INSTITUTE
00000152

EROS DATA CENTER
00000009

ORGANIZATION INDEX

ESSO RESEARCH & ENGINEERING CO.
00000238

FEDERAL ENERGY ADMINISTRATION
00000193 00000294

FEDERATION OF ROCKY MOUNTAIN STATES
00000180 00000282

HANNA MINING CO.
00000049 00000050 00000051 00000264 00000266

HOLLAND CONSTRUCTION CO.
00000226

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
00000190

IDAHO POWER CO.
00000131 00000139

INTASA
00000198

KAISER STEEL CO.
00000027

KNIFE RIVER COAL CO.
00000082

KUTAK, ROCK, COHEN, CAMPBELL, GARFINKEL & WOODWARD
00000197

LEWIS & CLARK 1805 REGIONAL COUNCIL FOR DEVELOPMENT
00000191

MARATHON OIL CO.
00000237

MARK HURD AERIAL SURVEYS, INC.
00000009

MICHIGAN-WISCONSIN PIPELINE CO.
00000196

MISSOURI BASIN POWER PROJECT
00000202 00000203 00000204

MISSOURI RIVER BASIN COMMISSION
00000124

MONSANTO CHEMICAL CO.
00000049

MONTANA BUREAU OF MINES & GEOLOGY
00000059 00000098 00000099 00000101 00000110

MONTANA COLLEGE OF MINERAL SCIENCES AND TECHNOLOGY
00000127

MONTANA COLLEGE OF MINERAL SCIENCES & TECHNOLOGY FOUNDATION
00000225

MONTANA DEPT. OF COMMUNITY AFFAIRS
00000110 00000184 00000201 00000277

MONTANA DEPT. OF FISH AND GAME
00000045 00000078 00000095

MONTANA DEPT. OF HEALTH & ENVIRONMENTAL SCIENCES
00000120 00000162 00000164

MONTANA DEPT. OF HIGHWAYS
00000110

MONTANA DEPT. OF NATURAL RESOURCES & CONSERVATION
00000086 00000099 00000110 00000124 00000134 00000180 00000206 00000207 00000270

MONTANA DEPT. OF SOCIAL & REHABILITATION SERVICES
00000206

MONTANA DEPT. OF STATE LANDS
00000079 00000269

MONTANA ENERGY ADVISORY COUNCIL
00000165 00000187

MONTANA POWER CO.
00000078 00000127 00000129 00000173 00000174 00000175 00000176 00000177 00000179

MONTANA STATE UNIV.
00000045 00000063 00000072 00000074 00000060 00000110 00000167 00000172 00000178 00000207

MONTANA STATE UNIV., AG. EXP. STATION
00000046 00000076 00000077 00000089 00000129

MONTANA STATE UNIV., DEPT. OF ANIMAL & RANGE SCIENCES
00000170 00000171 00000285

MONTANA STATE UNIV., DEPT. OF CIVIL ENG.
00000122 00000227

MONTANA STATE UNIV., DEPT. OF MECHANICAL ENG.
00000248

MONTANA STATE UNIV., WATER RESOURCES RESEARCH CENTER
00000142

MONTANA WATER QUALITY BUREAU
00000113 00000114 00000157

MOUNTAIN WEST RESEARCH, INC.
00000181

NATIONAL CENTER FOR ATMOSPHERIC RESEARCH
00000041

NATIONAL SCIENCE FOUNDATION
00000006 00000152 00000153 00000154 00000159 00000171 00000217 00000245 00000248 00000249 00000252
00000253 00000256 00000290

NATIONAL SCIENCE FOUNDATION, RANN
00000247 00000287

NATIONAL SCIENCE FOUNDATION, UNDERGRAD. RES. PART. PROG.
00000221

NATURAL GAS & PIPELINE CO. OF AMERICA
00000192

NAVAJO MINE
00000030

NAVAJO TRIBE
00000168

NEW MEXICO INSTITUTE OF MINING & TECHNOLOGY
00000022

NEW MEXICO STATE UNIV.
00000027 00000188

NORTH AMERICAN COAL CO.
00000052 00000196

NORTH AMERICAN WEATHER CONSULTANTS
00000137

NORTH DAKOTA GEOLOGICAL SURVEY
00000011 00000093

NORTH DAKOTA OFFICE OF THE GOVERNOR
00000199

NORTH DAKOTA PLANNING DIVISION
00000011 00000093 00000142

NORTH DAKOTA REGIONAL ENVIRONMENTAL ASSESSMENT PROGRAM - REAP
00000292

NORTH DAKOTA STATE BOARD FOR VOCATIONAL EDUCATION
00000189

NORTH DAKOTA STATE DEPT. OF HEALTH, DIV. OF ENV. ENE.
00000145

NORTH DAKOTA STATE HIGHWAY DEPT.
00000110 00000142

NORTH DAKOTA STATE INTERNATIONAL COMMISSION
00000110

NORTH DAKOTA STATE UNIV.
00000011

NORTH DAKOTA STATE UNIV., AG. EXP. STATION
00000061 00000062 00000065 00000192 00000279 00000280

NORTH DAKOTA STATE UNIV., COLLEGE OF SCIENCE & MATHEMATICS
00000238

NORTH DAKOTA STATE UNIV., DEPT. OF AGRICULTURAL ECONOMICS
00000192 00000280

NORTH DAKOTA STATE UNIV., DEPT. OF BOTANY
00000065 00000130

NORTH DAKOTA STATE UNIV., DEPT. OF SOILS
00000065 00000082 00000093 00000279

NORTH DAKOTA STATE UNIV., WATER RESOURCES RESEARCH INST.
00000142 00000278

NORTH DAKOTA STATE WATER COMMISSION
00000110

NORTHERN CHEYENNE RESEARCH PROJECT
00000094 00000208

NORTHERN GREAT PLAINS RESOURCES PROGRAM
00000142 00000209

ORGANIZATION INDEX

```
OAK RIDGE NATIONAL LABORATORY
                    00000257

OLD WEST REGIONAL COMMISSION
                    00000002  00000003  00000007  00000011  00000012  00000059  00000060  00000061  00000062  00000086  00000087
                    00000093  00000110  00000128  00000145  00000146  00000181  00000182  00000183  00000184  00000189  00000190
                    00000191  00000195  00000196  00000197  00000198  00000199  00000200  00000201  00000269  00000272  00000277
                    00000293

PACIFIC POWER & LIGHT CO.
                    00000088  00000131  00000139  00000140

PEABODY COAL CO.
                    00000017  00000036  00000089

PETER-KIEWIT CONSTRUCTION CO.
                    00000044

PITTSBURG-MIDWAY COAL CO.
                    00000023  00000026  00000027 00000028  00000029

PRINCETON UNIV.,DEPT. OF GEOLOGICAL & GEOPHYSICAL SCI.
                    00000249

PUGET SOUND POWER AND LIGHT
                    00000173  00000174  00000175  00000176  00000177

RADIAN CORP.
                    00000161  00000300

SIOUX VALLEY EMPIRE ELECTRIC ASSOC.
                    00000273

SOUTH DAKOTA DEPT. OF AG.
                    00000075

SOUTH DAKOTA FIFTH DISTRICT PLANNING & DEV. COMM.
                    00000003

SOUTH DAKOTA GEOLOGICAL SURVEY
                    00000118  00000251

SOUTH DAKOTA OFFICE OF ENERGY POLICY
                    00000297

SOUTH DAKOTA SCHOOL OF MINES & TECH.
                    00000012  00000128  00000179
```

SOUTH DAKOTA SCHOOL OF MINES & TECH., CHEM. ENG. DEPT.
00000221

SOUTH DAKOTA SCHOOL OF MINES & TECH., DEPT. OF MECH. ENG.
00000255

SOUTH DAKOTA SCHOOL OF MINES & TECH., DEPT. OF MINING ENG.
00000004

SOUTH DAKOTA SCHOOL OF MINES & TECH., ENG. & MINING EXP. ST.
00000222

SOUTH DAKOTA SCHOOL OF MINES & TECH., FOREST RESEARCH LAB.
00000031 00000032 00000033 00000034 00000035 00000036 00000090 00000091 00000143 00000260
00000261 00000262

SOUTH DAKOTA SCHOOL OF MINES & TECH., INST. OF ATMOS. SCI.
00000142 00000159

SOUTH DAKOTA SIXTH DISTRICT COUNCIL OF LOCAL GOVERNMENTS
00000002

SOUTH DAKOTA STATE PLANNING BUREAU
00000002 00000003 00000297

SOUTH DAKOTA STATE UNIV.
00000035 00000262

SOUTH DAKOTA STATE UNIV., AG. EXP. STATION
00000250 00000273

SOUTH DAKOTA STATE UNIV., FISH & WILDLIFE COOP. UNIT
00000151

THOMAS E. CARROLL ASSOCIATES
00000007 00000196

UNIV. OF ARIZONA
00000259

UNIV. OF IDAHO, BUREAU OF MINES & GEOLOGY
00000267 00000268

UNIV. OF IDAHO, COLL. OF FORESTRY, WILDLIFE, & RANGE SCI.
00000265

UNIV. OF MONTANA
00000071 00000115 00000153 00000167 00000171 00000172 00000178 00000206

UNIV. OF MONTANA, BUREAU OF BUSINESS & ECONOMIC RESEARCH
00000185 00000186

UNIV. OF MONTANA, COMMUNITY SERVICE & RESEARCH PROGRAM
00000209

UNIV. OF MONTANA, DEPT. OF BOTANY, ENVIRONMENTAL STUDIES LAB
00000134 00000135 00000136

UNIV. OF MONTANA, DEPT. OF GEOLOGY
00000268 00000289

UNIV. OF MONTANA, DEPT. OF WOOD CHEMISTRY
00000267

UNIV. OF MONTANA, ENVIRONMENTAL STUDIES PROGRAM
00000168 00000169 00000179

UNIV. OF MONTANA, INST. FOR SOCIAL SCI. RESEARCH
00000187

UNIV. OF NEBRASKA, DEPT. OF AGRICULTURAL ENGINEERING
00000272

UNIV. OF NEBRASKA, DEPT. OF CHEMISTRY
00000290

UNIV. OF NEBRASKA, DEPT. OF PHYSICS
00000256 00000290

UNIV. OF NEBRASKA, WATER RESOURCES INSTITUTE
00000272

UNIV. OF NEW MEXICO
00000023 00000024 00000026

UNIV. OF NORTH DAKOTA, DEPT. OF GEOGRAPHY
00000281

UNIV. OF NORTH DAKOTA, ENG. EXP. STATION
00000216

UNIV. OF NORTH DAKOTA, LAW SCHOOL
00000295

UNIV. OF NORTH DAKOTA, PROJECT RECLAMATION
00000085

UNIV. OF OKLAHOMA, SCIENCE & PUBLIC POLICY PROGRAM
00000217 00000300

UNIV. OF SOUTH DAKOTA, DEPT. OF ECONOMICS
00000297

ORGANIZATION INDEX

UNIV. OF UTAH, ENGINEERING EXP. STATION
00000138

UNIV. OF WISCONSIN, DEPT. OF WILDLIFE ECOLOGY
00000150

UNIV. OF WYOMING
00000148 00000160 00000202 00000203 00000252 00000271

UNIV. OF WYOMING, AG. EXP. STATION
00000063

UNIV. OF WYOMING, CHEMISTRY DEPT.
00000006

UNIV. OF WYOMING, DEPT. OF ATMOSPHERIC SCIENCE
00000146

UNIV. OF WYOMING, DEPT. OF CHEMISTRY
00000237

UNIV. OF WYOMING, DEPT. OF ELECTRICAL ENGINEERING
00000220 00000244

UNIV. OF WYOMING, DEPT. OF GEOLOGY
00000228 00000245 00000246 00000253 00000283

UNIV. OF WYOMING, DIV. OF BUS. AND ECON. RESEARCH
00000204

UNIV. OF WYOMING, GEOGRAPHY DEPT.
00000282

UNIV. OF WYOMING, LAW SCHOOL
00000200

UNIV. OF WYOMING, PLANT SCIENCES DIV.
00000064 00000139 00000147

UNIV. OF WYOMING, WATER RESOURCES RESEARCH INST.
00000063 00000090 00000142 00000144

UTAH INTERNATIONAL, INC.
00000021 00000025 00000026 00000027 00000028 00000030

UTAH POWER AND LIGHT
00000137 00000138

ORGANIZATION INDEX

UTAH STATE UNIV.
00000040

UTAH STATE UNIV., AG. EXP. STATION
00000039

UTAH STATE UNIV., COLLEGE OF NATURAL RESOURCES
00000039 00000275

UTAH STATE UNIV., COLLEGE OF SCIENCE
00000037

UTAH STATE UNIV., DEPT. OF FORESTRY & OUTDOOR RECREATION
00000275

UTAH STATE UNIV., WATER RESEARCH LAB.
00000038

U.S. AG. RESEARCH SERVICE
00000014 00000061 00000065 00000250

U.S. AG. RESEARCH SERVICE, NORTHERN GR. PLAINS RESEARCH CTR.
00000016 00000017 00000018 00000020 00000052 00000053 00000054 00000055 00000056 00000057 00000058
00000060 00000062 00000081 00000082 00000083 00000084

U.S. ATOMIC ENERGY COMM., DIV. OF WATSTE MANAGEMENT & TRANSP.
00000257

U.S. BUREAU OF INDIAN AFFAIRS
00000155

U.S. BUREAU OF LAND MANAGEMENT
00000009 00000066 00000067 00000068 00000069 00000070 00000079 00000097 00000102 00000106 00000107
00000110 00000220

U.S. BUREAU OF MINES
00000243

U.S. BUREAU OF MINES, DENVER MIN. RESEARCH CTR.
00000085

U.S. BUREAU OF MINES, SPOKANE MINING RESEARCH CENTER
00000224 00000225 00000226

U.S. BUREAU OF RECLAMATION
00000067 00000068 00000069 00000070 00000095 00000102 00000110

U.S. BUREAU OF SPORT FISHERIES AND WILDLIFE
00000110

ORGANIZATION INDEX

U.S. CORPS OF ENGINEERS
00000110

U.S. DEPT. OF AGRICULTURE, COOP. STATE RESEARCH SERVICE
00000014 00000130

U.S. DEPT. OF AG., ECONOMIC RESEARCH SERVICE
00000205

U.S. DEPT. OF DEFENSE, AIR FORCE OFFICE SCIENTIFIC RESEARCH
00000239

U.S. DEPT. OF H.E.W., OFFICE OF NATIVE AMERICAN PROGRAMS
00000094 00000208

U.S. DEPT. OF INTERIOR
00000110

U.S. DEPT. OF INTERIOR, OFFICE OF WATER RESEARCH & TECH.
00000186 00000207 00000278

U.S. DEPT. OF STATE
00000110

U.S. DEPT. OF TRANSPORTATION, FEDERAL HIGHWAY ADMIN.
00000239

U.S. EPA
00000063 00000094 00000110 00000135 00000142 00000205 00000288 00000289

U.S. EPA, CINCINNATI NAT. ENV. RESEARCH CENTER
00000096 00000122 00000270

U.S. EPA, CORVALLIS NAT. ENV. RESEARCH CENTER
00000166 00000170 00000172

U.S. EPA, OFFICE OF ENERGY
00000300

U.S. EPA, OFFICE OF WATER RESOURCES RESEARCH
00000192

U.S. EPA, REGION VIII
00000074 00000111 00000112 00000113 00000114 00000115 00000116 00000117 00000120 00000123 00000126
00000157 00000158 00000161 00000162 00000163 00000164 00000165

U.S. ERDA
00000194 00000216 00000239 00000250 00000271

U.S. ERDA, AMES LAB.
00000167 00000178

ORGANIZATION INDEX

U.S. ERDA, ARGONNE NATIONAL LAB.
00000001 00000073 00000156

U.S. ERDA, ARGONNE NATIONAL LAB.,ENERGY & ENV. SYSTEMS DIV.
00000261

U.S. ERDA, BARTLESVILLE ENERGY RESEARCH CENTER
00000212 00000235

U.S. ERDA, BATTELLE PACIFIC NW LAB.
00000167 00000178

U.S. ERDA, DIV. OF APPLIED TECHNOLOGY
00000211 00000243

U.S. ERDA, DIV. OF BIOMEDICAL & ENV. RESEARCH
00000001 00000071 00000072 00000073 00000156

U.S. ERDA, GRAND FORKS ENERGY RESEARCH CENTER
00000013 00000019 00000132 00000133 00000141 00000213 00000214 00000219

U.S. ERDA, LARAMIE ENERGY RESEARCH CENTER
00000212 00000215 00000230 00000231 00000232 00000233 00000234 00000236
00000240 00000241 00000242

U.S. ERDA, LAWRENCE LIVERMORE LAB., CHEM. & MAT. SCI. DIV.
00000211

U.S. ERDA, LAWRENCE LIVERMORE LAB., EARTH SCI. DIV.
00000211

U.S. ERDA, LOS ALAMOS SCIENTIFIC LAB.
00000180

U.S. ERDA, OFFICE OF COAL RESEARCH
00000210 00000216 00000222

U.S. FISH & WILDLIFE SERV.
00000009 00000010 00000254

U.S. FISH & WILDLIFE SERV., DENVER WILDLIFE RESEARCH CTR.
00000149

U.S. FISH & WILDLIFE SERV., OFFICE OF BIOL. SERV.
00000149 00000150 00000151 00000295

U.S. FOREST SERVICE, BLACK HILLS NATIONAL FOREST
00000143

ORGANIZATION INDEX

U.S. FOREST SERVICE, CARIBOU NATIONAL FOREST
00000049

U.S. FOREST SERVICE, CUSTER NATIONAL FOREST
00000043 00000049 00000050 00000051 00000263

U.S. FOREST SERVICE, FOREST & RANGE WATERSHED LAB.
00000258

U.S. FOREST SERVICE, FORESTRY SCI. LAB
00000223

U.S. FOREST SERVICE, GALLATIN NATIONAL FOREST
00000263

U.S. FOREST SERVICE, INTERMTN. FOREST & RANGE EXP. STATION
00000037 00000038 00000039 00000040 00000041 00000042 00000043 00000044 00000045 00000046 00000047
00000048 00000049 00000050 00000051 00000080 00000263 00000264 00000265 00000266 00000267 00000268
00000291

U.S. FOREST SERVICE, MEDICINE BOW NATIONAL FOREST
00000144

U.S. FOREST SERVICE, MISSOULA EQUIPMENT DEV. CENTER
00000079

U.S. FOREST SERVICE, NATIONAL HAIL RESEARCH CENTER
00000041

U.S. FOREST SERVICE, REGION I
00000284

U.S. FOREST SERVICE, REGION I, STATE & PRIV. FORESTRY
00000179

U.S. FOREST SERVICE, REGION 3
00000259

U.S. FOREST SERVICE, ROCKY MTN. FOREST & RANGE EXP. STATION
00000022 00000023 00000024 00000025 00000026 00000027 00000028 00000029 00000030 00000144 00000188

U.S. FOREST SERVICE, SALMON NATIONAL FOREST
00000041 00000043 00000049 00000050 00000051 00000264

U.S. FOREST SERVICE, SURFACE ENVIRONMENT AND MINING
00000017 00000021 00000022 00000023 00000024 00000025 00000026 00000027 00000028 00000029 00000030
00000031 00000032 00000033 00000034 00000035 00000036 00000037 00000038 00000039 00000040 00000041
00000042 00000043 00000044 00000045 00000046 00000047 00000048 00000049 00000050 00000051 00000052
00000053 00000077 00000081 00000083 00000090 00000091 00000142 00000143 00000144 00000168 00000169
00000179 00000188 00000227 00000259 00000260 00000261 00000262 00000263 00000264 00000265 00000266
00000267 00000268 00000274 00000275 00000276 00000284 00000285 00000286 00000291

U.S. GEOLOGICAL SURVEY
00000008 00000110 00000111 00000112 00000158 00000229 00000246 00000283

U.S. GEOLOGICAL SURVEY, GEOLOGIC DIV.
00000067 00000068 00000069 00000070

U.S. GEOLOGICAL SURVEY, NATIONAL CENTER
00000154

U.S. GEOLOGICAL SURVEY, WATER RESOURCES DIV.
00000067 00000068 00000069 00000070 00000092 00000097 00000098 00000099
00000100 00000101 00000102 00000103 00000104 00000105 00000106 00000107
00000108 00000109 00000116 00000117 00000123 00000125 00000126 00000155

U. S. GRAIN MARKETING RESEARCH CENTER
00000250

U.S. NATIONAL AERONAUTICS & SPACE ADMIN.
00000180 00000282

U.S. NATIONAL BUREAU OF STANDARDS
00000287

U.S. NATIONAL OCEANIC & ATMOSPHERIC ADMIN.
00000166 00000172

U.S. SOIL CONSERVATION SERVICE
00000015 00000054

WESTERN ANALYSIS
00000183

WESTERN ENERGY CO.
00000036 00000076 00000077 00000127 00000225

WESTERN SCIENTIFIC SERVICES, INC.
00000131 00000163

WYODAK MINE
00000226

WYOMING DEPT. OF AGRICULTURE
00000110

WYOMING DEPT. OF ECONOMIC PLANNING & DEVELOPMENT
00000110 00000119 00000182 00000293 00000294 00000298 00000299

WYOMING DEPT. OF ENVIRONMENTAL QUALITY
00000110

WYOMING ENVIRONMENTAL INSTITUTE
00000160

WYOMING GEOLOGICAL SURVEY
00000005 00000228 00000299

WYOMING HIGHWAY DEPT.
00000110

WYOMING STATE ENGINEER
00000087 00000105 00000110

WYOMING STATE LAND COMMISSION
00000260

YORK RESEARCH CORP.
00000140

SUBJECT
INDEX

ACID MINE DRAINAGE
00000039 00000265 00000268 00000270

ACID RAIN
00000134 00000136 00000178

ACID SPOILS
00000037 00000266

ADAMS CO., ND
00000009

ADAPTATION
00000018 00000028 00000031 00000034 00000037 00000040 00000047 00000062 00000064 00000071 00000072
00000084 00000261

AEOLIAN GEOMORPHOLOGY
00000253

AERIAL PHOTOGRAPHY
00000009 00000170 00000175 00000180 00000253 00000254 00000271 00000281 00000283 00000285

AEROSOLS
00000166

AGRICULTURE
00000062 00000250 00000273

AIR POLLUTION
00000002 00000003 00000128 00000129 00000130 00000131 00000132 00000133 00000134 00000136 00000140
00000141 00000142 00000143 00000145 00000146 00000147 00000152 00000159 00000161 00000162 00000164
00000165 00000166 00000167 00000168 00000169 00000170 00000172 00000174 00000178 00000179 00000236

AIR QUALITY
00000163 00000174

AIRFOIL
00000248

ALKALI SACATON
00000025

ALKALINE POLLUTION
00000039

ALPINE ECOSYSTEMS
00000258

ALTERNATE ENERGY
00000247 00000248 00000249 00000250 00000251 00000252 00000253 00000254 00000255 00000273

ALTERNATIVE STUDIES
00000001 00000007 00000008 00000042 00000044 00000059 00000067 00000068 00000069 00000070 00000073
00000086 00000091 00000096 00000100 00000102 00000119 00000124 00000144 00000156 00000185 00000186
00000192 00000193 00000196 00000198 00000200 00000201 00000217 00000244 00000258 00000274 00000279
00000292 00000300

ALTCA, UT
00000069

AMAX MINE
00000090

ANALYTICAL TECHNIQUES
00000081

ANIMAL PHYSIOLOGY
00000129 00000134

ANNUAL PUBLICATIONS
00000005 00000298

AQUATIC ECOSYSTEMS
00000086 00000113 00000114 00000115 00000116 00000121 00000130 00000144 00000157 00000167 00000268
00000270 00000289

AQUIFERS
00000090 00000092 00000093 00000098 00000099 00000100 00000101 00000104 00000107 00000108 00000109
00000116 00000118 00000123 00000125

ARID CLIMATES
00000021 00000022 00000023 00000024 00000024 00000025 00000026 00000027 00000028 00000029 00000030
00000259

ARTESIAN WELLS
00000251

ASH FOULING
00000133

ATMOSPHERE
00000137 00000138 00000140 00000142 00000152 00000156 00000159 00000174

ATOMIC COLLISIONS
00000256

BALLARD MINE
00000038

BASELINE DATA
00000022 00000041 00000066 00000067 00000068 00000069 00000070 00000073 00000089 00000092 00000093
00000094 00000097 00000099 00000100 00000102 00000103 00000105 00000106 00000108 00000109 00000110
00000111 00000112 00000116 00000122 00000125 00000129 00000130 00000134 00000137 00000138 00000139
00000142 00000143 00000144 00000148 00000151 00000153 00000158 00000163 00000164 00000165 00000166
00000168 00000169 00000170 00000171 00000173 00000175 00000176 00000178 00000179 00000180 00000181
00000188 00000197 00000217 00000222 00000229 00000240 00000251 00000258 00000274 00000277 00000279
00000280 00000285 00000289 00000292

BAYES ALGORITHM
00000220

BELLE AYR MINE
00000090

BELT TRANSECT SAMPLING
00000023

BENTONITE
00000091 00000260 00000261 00000262 00000269

BEULAH, ND
00000142

BIGHORN CO., MT
00000010 00000074 00000193

BIGHORN RIVER
00000009 00000010

BILLINGS CO., ND
00000009

BIOASSAY
00000038 00000121 00000265

BIOENVIRONMENT
00000001 00000078 00000089 00000112 00000115 00000129 00000130 00000134 00000135 00000136 00000138
00000139 00000145 00000147 00000148 00000153 00000156 00000167 00000168 00000169 00000170 00000171
00000172 00000175 00000177 00000178 00000179 00000236 00000275

BIRDS
00000032

BIRNEY, MT
00000185 00000187

BLACK HILLS
00000143 00000169 00000271

BLACK THUNDER MINE
00000148 00000160

BLACKBIRD MINE
00000038 00000268

BOOM TOWNS
00000181 00000182 00000184 00000188 00000190 00000191 00000193 00000195 00000197 00000199 00000200
00000201 00000205

BOWMAN CO., ND
00000009

BROADWATER CO., MT
00000254

BURLEIGH CO., ND
00000009

BYPRODUCTS
00000231

CAMPBELL CO., WY
00000034 00000035 00000144 00000160

CANADA
00000114 00000157

CARBON DIOXIDE ACCEPTOR PROCESS
00000210 00000222

CARBONIZATION
00000216

CARTER CO., MT
00000009

CASH FLOW ANALYSIS
00000193 00000194 00000195

CATION EXCHANGE
00000083

CELLULAR COMPOSITING
00000277

CELLULOSE
00000287

CELLULOSIC MATERIALS
00000287

CEMENTATION
00000246

CHELATES
00000059 00000238

CHEMICAL ANALYSIS
00000233

CHEMICAL PROPERTIES
00000006 00000039 00000059 00000063 00000065 00000066 00000099 00000103 00000104 00000109 00000110
00000116 00000122 00000123 00000228

CIRCLE, MT
00000201

CLASSIFICATION SYSTEMS
00000275

CLIMATOLOGY
00000142 00000146 00000159 00000253

COAL
SEE CHAPTER 1.0 AND:
00000232 00000281 00000299 00000300

COAL ASH
00000219

COAL CHAR
00000213

COAL DRYING
00000214

COAL EXTRACTION
00000225

COAL HANDLING
00000214

COAL MINES
00000005

COAL SEAMS
00000225

COAL STORAGE
00000214

COAL TRANSPORT
00000214

COBALT
00000041 00000043 00000049 00000050 00000051 00000264 00000266 00000268

COLONY, WY
00000261 00000262

SUBJECT INDEX

COLOR IMAGE ENHANCER
00000284

COLOR INFRARED PHOTOGRAPHY
00000009 00000175 00000180 00000254 00000281 00000283 00000285

COLSTRIP, MT
00000059 00000078 00000080 00000127 00000134 00000152 00000162 00000163 00000165 00000166 00000167
00000168 00000169 00000173 00000174 00000175 00000176 00000177 00000178 00000179 00000206 00000229

COMMODITY ANALYSIS
00000005 00000228 00000298

COMPARABLE SITUATIONS ANALYSIS
00000204

COMPOUND CHARACTERISTICS
00000232 00000234 00000238

COMPUTER ANALYSIS
00000010

COMPUTER GRAPHICS
00000276

COMPUTER MODELS
00000008 00000092 00000154 00000180 00000203 00000274 00000275 00000276 00000277 00000280 00000285
00000292 00000294 00000297

CONDUCTORS
00000290

CONIFEROUS HABITATS
00000168 00000169 00000179

CONSTRUCTION PROJECTS
00000181 00000189 00000190 00000195 00000201

CONTINUOUS EXCAVATOR-LOADER
00000226

CONTOURING
00000014 00000021 00000064 00000097

COOKE CITY, MT
00000263

COOLING SYSTEMS
00000028

COPPER
00000041 00000043 00000049 00000050 00000051 00000259 00000264 00000266 00000268

CORN DRYING
00000250

CORNONACH, SASKATCHEWAN, CANADA
00000114

COST EFFECTIVENESS
00000073

COUR D'ALENE MINING DISTRICT
00000265

CROP PLANTS
00000062 00000082 00000147

CROW INDIAN RESERVATION
00000155

CUSTER NATIONAL FOREST
00000168 00000169 00000179 00000285

CUSTER, CO., MT
00000009

DATA COLLECTION
00000108 00000154

DAVE JOHNSTON PLANT
00000088 00000140

DAWSON CO., MT
00000009

DECKER MINE
00000038 00000044 00000048

DECKER, MT
00000185 00000187

DEMOGRAPHY
00000181 00000296

DENSITOMETERS
00000006 00000284

DESULFURIZATION
00000213

DEVILS LAKE, ND
00000278

DIGITIZING
00000277 00000284

DISPERSIONS
00000142 00000152

DISTICHLIS STRICTA
00000026

DIVERSIONS
00000095 00000278

DRAINAGE
00000091

DROUGHT TOLERANCE
00000040

DUNN CO., ND
00000009

EAST POPLAR RIVER
00000114 00000157

ECONOMIC ANALYSIS
00000066 00000119 00000124 00000153 00000193 00000194 00000195 00000196 00000203 00000204 00000205
00000217 00000297

ECONOMIC DEVELOPMENT
00000106 00000107

ECONOMIC IMPACT
00000001 00000007 00000119 00000161 00000185 00000186 00000192 00000193 00000194 00000196 00000198
00000205 00000297 00000300

ECOSYM
00000275

ECOSYSTEM CLASSIFICATION
00000275 00000285

ELECTRIC POWER TRANSMISSION
00000003

ELECTRIC POWERPLANTS
00000001 00000098 00000114 00000128 00000131 00000136 00000139 00000140 00000141 00000142 00000143
00000145 00000146 00000147 00000152 00000153 00000157 00000159 00000162 00000164 00000165 00000166
00000167 00000168 00000169 00000170 00000171 00000172 00000178 00000179 00000189 00000202 00000203
00000204 00000206 00000219

ELECTRICAL CONDUCTIVITY
00000017 00000249

ELECTROMAGNETIC CONDUCTORS
00000220

ELECTROMAGNETIC INDUCTION
00000220

EMERY CO., LT
00000193

EMISSIONS
00000161

ENERGY CONSERVATION
00000212 00000250 00000273

ENERGY CONSUMPTION
00000293 00000294

ENERGY CONVERSION
00000001 00000114 00000115 00000121 00000145 00000161 00000167 00000213 00000216 00000217 00000219
00000230 00000287 00000299

ENERGY DEVELOPMENT
00000001 00000009 00000073 00000086 00000087 00000092 00000101 00000106 00000108 00000111 00000158
00000161 00000182 00000184 00000189 00000190 00000191 00000198 00000199 00000200 00000285 00000295
00000297 00000299 00000300

ENHANCED IMAGERY
00000271

ENVIRONMENTAL IMPACT
00000001 00000004 00000007 00000008 00000119 00000124 00000153 00000154 00000155 00000156 00000160
00000167 00000196 00000198 00000208 00000227 00000236 00000242 00000254 00000267 00000292 00000295
00000300

ENVIRONMENTAL IMPACT STATEMENTS
00000134 00000154 00000155 00000160 00000198 00000203

EROSION
00000021 00000031 00000039 00000042 00000048 00000060 00000097 00000107 00000269

ERTS
00000106 00000180 00000253 00000271 00000278 00000282 00000283

ERTS-1
00000010

ETHNOGRAPHIC STUDIES
00000209

EVAPORATE MINERALS
00000245

EVAPOTRANSPIRATION
00000097

FERTILIZERS
00000046 00000050 00000055 00000062 00000077 00000082

FISH POPULATIONS
00000095 00000118 00000120 00000144 00000157 00000268

FISHERIES STUDIES
00000114 00000157

FLOODING
00000235 00000243

FLUORIDE
00000134 00000135 00000136

FLY ASH
00000006 00000133 00000141 00000213

FOOD CHAIN
00000167

FORECASTING
00000098 00000100 00000106 00000108 00000109 00000110 00000116 00000153 00000154 00000156 00000172
00000181 00000189 00000194 00000196 00000203 00000205 00000244

FORT UNION BASIN
00000017 00000071 00000092 00000093 00000099 00000104 00000135 00000153 00000162 00000164 00000194

FOURWING SALTBUSH
00000025 00000027

FRACTURING
00000235 00000236 00000243

FUEL OIL
00000221

FUEL PRODUCTION
00000293

FUELS
00000212 00000216 00000241

GALENA CREEK MINE
00000270

GALLATIN CO., MT
00000254

GARRISON DAM
00000009

GARRISON, ND
00000278

GAS INJECTION
00000235 00000243

GAS RECOVERY
00000243

GASCOYNE, ND
00000117

GASIFICATION
00000002 00000003 00000121 00000132 00000161 00000189 00000195 00000196 00000210 00000211 00000215
00000216 00000218 00000220 00000222 00000231 00000241 00000281

GENOTYPES
00000037

GEOCHEMICAL SURVEYS
00000229

GEOLOGIC INVESTIGATIONS
00000093 00000094 00000100 00000101 00000102 00000103 00000104 00000105 00000116 00000118 00000245
00000246 00000283

GEOPHYSICAL SURVEYS
00000098 00000101 00000102 00000104 00000106 00000108

GEOPHYSICS
00000220

GEOSTATISTICS
00000228

GEOTHERMAL
00000247 00000249 00000251 00000252 00000254 00000300

GERMINATION
00000024

GILLETTE, WY
00000116 00000226

GOAL PROGRAMMING
00000274

GOLD
00000050 00000051 00000263

GOLDEN VALLEY CO., ND
00000009

GOVERNMENT INFRASTRUCTURE
00000197 00000200 00000205

GRASSES
00000018 00000024 00000047 00000049 00000055 00000057 00000058 00000084 00000130

SUBJECT INDEX

GRASSLAND ECOSYSTEMS
00000165 00000172

GREAT DIVIDE BASIN
00000106

GREEN AREA
00000143

GREEN RIVER BASIN
00000106 00000112 00000271

GREEN RIVER FORMATION
00000233 00000240 00000245

GREEN RIVER, WY
00000193

GROUNDWATER
00000011 00000059 00000063 00000066 00000067 00000068 00000069 00000070 00000074 00000087 00000089
00000090 00000092 00000093 00000094 00000098 00000099 00000100 00000102 00000103 00000104 00000105
00000106 00000106 00000107 00000108 00000109 00000110 00000115 00000116 00000117 00000122 00000123
00000125 00000127 00000144 00000268

GROUNDWATER RECHARGE
00000012

GROWTH MANAGEMENT
00000200 00000201

HANNA, WY
00000068 00000107 00000215

HARDIN, MT
00000010

HAY DRYING
00000273

HEAT FLOW
00000252

HEAVY METALS
00000049 00000050 00000051 00000258 00000263 00000264 00000265 00000268 00000270

HEITINGER CO., NC
00000009

HIGH ELEVATION MINING
00000263

SUBJECT INDEX

HIGH-BTU GAS
00000132 00000210

HUMAN RESOURCES
00000188

HYDRAULIC CONDUCTIVITY
00000063 00000083

HYDRAULIC PROPERTIES
00000090 00000092 00000100

HYDROCARBON UTILIZATION
00000212

HYDROELECTRIC GENERATORS
00000299

HYDROGENATION
00000216

HYDROLOGY
00000011 00000022 00000039 00000048 00000059 00000060 00000089 00000090 00000091 00000092 00000093
00000096 00000097 00000098 00000099 00000100 00000101 00000102 00000103 00000104 00000106 00000107
00000108 00000109 00000110 00000116 00000117 00000118 00000127 00000144 00000153 00000270

HYDROMULCHING
00000050 00000264

INDICATOR SPECIES
00000115 00000147 00000167 00000172 00000289

INELASTIC SCATTERING
00000256

INFILTRATION
00000048 00000051 00000061 00000093 00000105

INFORMATION SYSTEMS
00000073 00000292

INFRARED PHOTOGRAPHY
00000041 00000175 00000180 00000281 00000283 00000285

INPUT-OUTPUT MODEL
00000297

INSECTS
00000135

INSTREAM ANALYSIS
00000115

INSTRUMENTATION
00000006 00000060 00000291

INTERSPECIES COMPETITION
00000065

INTRODUCED SPECIES
00000028 00000033 00000046 00000049 00000055 00000056 00000057 00000062 00000077 00000084 00000260

IN-SITU COMBUSTION
00000235 00000243

IN-SITU GASIFICATION
00000107 00000211 00000215 00000241

IN-SITU OIL RECOVERY
00000230

IN-SITU PROCESSING
00000233 00000234 00000242

IN-SITU RETORTING
00000236

IN-STREAM ANALYSIS
00000288 00000289

IONIZATION
00000256

IRRIGATION
00000064 00000086 00000189

JEFFERSON CO., MT
00000254

JIM BRIDGER POWER PLANT
00000131 00000139

LABORATORY METHODOLOGY
00000081

LAND OWNERSHIP
00000277

LAND RESOURCES
00000124

LAND USE
00000002 00000003 00000007 00000103 00000153 00000171 00000180 00000192 00000194 00000197 00000274
00000275 00000276 00000278 00000279 00000280 00000281 00000282 00000283 00000284 00000285

LANDSAT
00000010 00000278

LASAR RADAR SYSTEM
00000166

LEACHING
00000023 00000074 00000083

LEGAL ASPECTS
00000110 00000197 00000199 00000200 00000201 00000207 00000208 00000295 00000300

LEGISLATION
00000197

LEONARDITE
00000085

LEVIATHAN MINE
00000038

LEWIS & CLARK CO., MT
00000254

LIDAR
00000166

LIGNITE
00000014 00000016 00000019 00000020 00000052 00000054 00000056 00000057 00000058 00000103 00000141
00000192 00000194 00000196 00000210 00000213 00000218 00000219

LIMITED DIMENSIONALITY CONDUCTORS
00000290

LINEAR ORGANIC CONDUCTORS
00000290

LIQUEFACTION
00000221

LIQUID FUELS
00000212

LIQUIFACTION
00000195 00000216

LITTLE POWDER RIVER
00000144

LIVESTOCK
00000258

LOW-BTU GAS
00000215 00000231

LUMINESCENCE
00000006

LYNX LAKE
00000259

MADISON LIMESTONE
00000092 00000098 00000101 00000105 00000118 00000125

MANAGEMENT
00000014 00000062 00000094 00000096 00000104 00000106 00000110 00000244 00000258 00000275 00000279 00000292

MAPPING
00000010 00000022 00000091 00000098 00000099 00000104 00000116 00000170 00000171 00000180 00000269 00000277 00000278 00000279 00000282 00000283 00000285 00000299

MARYSVILLE, MT
00000247

MATHEMATICAL MODELS
00000096 00000177 00000220 00000244

MCCLAREN MINE
00000263

MCCONE CO., MT
00000069

MCKINLEY MINE
00000029

MCLEAN CO., ND
00000009

MEDICINE PARK, CO., MT
00000254

MERCER CO., ND
00000009 00000196 00000277 00000281

METEOROLOGICAL DATA
00000131 00000137 00000143 00000152 00000163 00000164 00000166 00000172 00000176

MICHIGAN-WISCONSIN PIPELINE CO.
00000196

MICROBIOLOGY
00000027 00000038 00000051

SUBJECT INDEX

MICROCLIMATES
00000064

MICROENVIRONMENT
00000041

MICRO-DENSITOMETERS
00000284

MINE WASTES
00000156

MINERAL INDUSTRY
00000293 00000294 00000298

MINERALS EXPLORATION
00000227 00000246 00000267 00000271

MINING EQUIPMENT
00000029 00000030 00000224 00000225

MINING METHODOLOGY
00000224 00000225 00000226 00000227 00000286

MISSOURI BASIN POWER PROJECT
00000183

MISSOURI RIVER BASIN
00000111 00000123

MOBILE FACILITIES
00000190

MODELS
00000086 00000098 00000100 00000101 00000102 00000103 00000106 00000108 00000109 00000120 00000122
00000146 00000159 00000163 00000165 00000167 00000170 00000180 00000181 00000194 00000203 00000245
00000292 00000297 00000300

MONITORING
00000067 00000068 00000069 00000070 00000093 00000097 00000099 00000102 00000105 00000105 00000106
00000107 00000111 00000117 00000120 00000127 00000142 00000143 00000144 00000145 00000146 00000152
00000153 00000158 00000162 00000165 00000166 00000168 00000169 00000170 00000171 00000174 00000178
00000222

MORTON CO., ND
00000009

MOSAIC
00000276

MULCHES
00000014 00000050 00000054 00000056 00000057 00000264

MYCORRHIZAE
00000027

NAHCOLITE
00000213

NATIVE HABITATS
00000032

NATIVE SPECIES
00000024 00000025 00000026 00000027 00000028 00000030 00000031 00000046 00000049 00000052 00000055
00000062 00000065 00000071 00000076 00000077 00000084 00000147 00000170

NATURAL GAS
00000106 00000107 00000196 00000235 00000243 00000298 00000299 00000300

NAVAJO MINE
00000025 00000030

NE. ALBANY SHALES
00000233

NONGAME BIRDS
00000149 00000150

NORTH AMERICAN COAL CORP.
00000196

NORTH PLATTE RIVER
00000068

NORTHERN CHEYENNE RESEARCH PROJECT
00000094 00000208

NORTHERN CHEYENNE TRIBE
00000094 00000208

NORTHERN GREAT PLAINS
00000003 00000004 00000019 00000031 00000046 00000053 00000073 00000077 00000091 00000092 00000097
00000110 00000115 00000125 00000128 00000142 00000150 00000159 00000163 00000205 00000209 00000226
00000229 00000286 00000289

NORTHERN GREAT PLAINS RESOURCES PROGRAM
00000008 00000198 00000274

NUCLEAR ENERGY
00000256 00000257

NUCLEAR FUSION
00000256

OAHE RESERVOIR
00000009

OCCUPATIONAL NEEDS
00000189

OIL
00000136 00000230

OIL RECOVERY
00000237 00000243

OIL RESERVOIRS
0000244

OILSHALE
00000006 00000097 00000106 00000121 00000161 00000193 00000205 00000212 00000217 00000231 00000232
00000233 00000234 00000236 00000240 00000241 00000242 00000245 00000300

OILSHALE CONVERSION
00000161

OLIVER CO., ND
00000009

OPEN PIT MINING
00000260

ORPHAN SPOILS
00000259

OTTER CREEK, MT
00000067

OUTMIGRATION
00000296

OVERBURDEN
00000022 00000038 00000047 00000048 00000050 00000051 00000053 00000054 00000058 00000059 00000064
00000081 00000103 00000266

OVERBURDEN CHARACTERISTICS
00000036 00000061 00000063 00000065 00000066 00000067 00000068 00000069 00000070 00000122

PADDLEFISH - POLYODON SPATHULA
00000289

PALEOZOIC ROCKS
00000109

PERMEABILITY
00000012 00000059 00000083 00000109 00000246 00000260

PETROLEUM
00000106 00000107 00000212 00000235 00000237 00000238 00000239 00000243 00000244 00000246 00000298
00000299 00000300

PETROLEUM REFINING
00000231

PETROLEUM SULFONATES
00000006 00000237

PHENOLOGY
00000148

PHOSPHATE
00000049 00000050

PHOTOGRAMMETRY
00000043 00000171 00000267 00000271 00000283

PHOTOINTERPRETATION
00000043

PHOTOMONTAGE
00000276

PHYSICOCHEMICAL PROPERTIES
00000006 00000022 00000034 00000035 00000053 00000061 00000093 00000116 00000228 00000237 00000261
00000262

PIERRE SHALE
00000100

PILOT BALLOON OBSERVATIONS
00000163

PILOT PLANTS
00000141 00000218 00000222

PIPELINES
00000299

PLANNING
00000067 00000068 00000069 00000070 00000073 00000092 00000094 00000097 00000098 00000101 00000103
00000104 00000106 00000108 00000109 00000110 00000116 00000117 00000124 00000153 00000154 00000156
00000161 00000182 00000184 00000191 00000198 00000201 00000205 00000209 00000224 00000228 00000244
00000275 00000279 00000280 00000292 00000297

PLANT ECOLOGY
00000089 00000130 00000142 00000148 00000286

PLANT ESTABLISHMENT
00000011 00000015 00000017 00000023 00000029 00000030 00000033 00000037 00000040 00000046 00000049
00000050 00000054 00000055 00000057 00000058 00000061 00000062 00000064 00000065 00000071 00000072
00000076 00000077 00000079 00000082 00000083 00000259 00000261 00000265

SUBJECT INDEX

PLANT MATERIALS 00000015 00000037

PLANT PHYSIOLOGY 00000015 00000040 00000045 00000051 00000129 00000130 00000134 00000291

PLUMES 00000146 00000166

POLICY DEVELOPMENT 00000193

POLICY ISSUES 00000145 00000207 00000300

PONDEROSA PINE 00000134 00000168 00000169 00000179

POPLAR RIVER 00000120

POPULATION DECLINE 00000296

POPULATION GROWTH 00000007 00000195 00000197 00000199 00000200 00000201 00000205

POPULATION PROJECTIONS 00000185 00000189 00000192 00000193 00000194 00000196

POROSITY 00000012 00000246

PORPHYRINS 00000238

POWDER RIVER BASIN 00000008 00000012 00000036 00000087 00000090 00000091 00000101 00000108 00000109 00000112 00000144 00000198 00000229 00000271 00000283

PRECIPITATION ANALYSIS 00000176

PRECIPITATION PROCESSES 00000159

PREDATOR POPULATIONS 00000149

PREMINING STUDIES 00000022 00000036 00000041 00000059 00000091 00000224

PREY ABUNDANCE
00000149

PROCEDURES MANUALS
00000183 00000195 00000199 00000200 00000201

PROJECT LIGNITE
00000216

PROJECT RECLAMATION
00000085

PUBLIC FINANCE
00000193 00000194 00000205

RABBITS
00000033

RADIATION DAMAGE
00000256

RADIOACTIVE WASTE
00000257

RADIOACTIVITY
00000252

RANGE ECOLOGY
00000082 00000089 00000168 00000171

RANGE PLANTS
00000084

RANGELAND ECOSYSTEMS
00000171

RAPID CITY GASIFICATION PILOT PLANT
00000222

REAP
00000292

RECHARGE
00000087

RECLAMATION SEE CHAPTER 1.2 AND:
00000004 00000093 00000096 00000099 00000102 00000107 00000150 00000165 00000224 00000227 00000258
00000259 00000260 00000261 00000262 00000263 00000264 00000265 00000266 00000269 00000270 00000286

RECREATION
00000031 00000086 00000277

REFINERIES
00000299

REFINING 00000238 00000239 00000240 00000241

REGIONAL STUDIES PROGRAM 00000001

REGULATIONS 00000116 00000117 00000145 00000190 00000197 00000199 00000200 00000201 00000300

REHABILITATION 00000024 00000031 00000032 00000034 00000035 00000042 00000044 00000046 00000052 00000066 00000077
00000091 00000093 00000097 00000260 00000262 00000263 00000265

REMOTE SENSING 00000041 00000153 00000171 00000172 00000180 00000267 00000271 00000278 00000281 00000282 00000283
00000284

RESEARCH AND DEVELOPMENT 00000081 00000274 00000286

RESEARCH ASSESSMENT 00000002 00000003 00000013

RESOURCE INVENTORY 00000041 00000180 00000277 00000279 00000280 00000281 00000282

RETORTING 00000242

REVEGETATION 00000011 00000017 00000018 00000020 00000023 00000024 00000025 00000026 00000027 00000028 00000029
00000030 00000031 00000032 00000033 00000034 00000037 00000038 00000040 00000041 00000043 00000043
00000044 00000045 00000046 00000047 00000049 00000050 00000051 00000052 00000054 00000055 00000056
00000057 00000058 00000061 00000062 00000071 00000072 00000080 00000082 00000083 00000084 00000096
00000261 00000262 00000263 00000264 00000266 00000269 00000286

REVENUE ALLOCATIONS 00000193 00000205

RHEOLOGY 00000221

RICHLAND CO., MT 00000009

RIO BLANCO CO., CO 00000193

RIPARIAN PLANTS 00000010 00000115

ROCK SPRINGS, WY 00000193

ROOSEVELT CO., MT
00000009

ROOT ZONE
00000060 00000263

ROSEBUD CO., MT
00000074 00000206 00000277

RUNOFF
00000021 00000029 00000030 00000060 00000097 00000144 00000259

RURAL DEVELOPMENT
00000188 00000194 00000205 00000279 00000296

SAGE GROUSE
00000149

SAGEBRUSH
00000045

SALT TOLERANCE
00000017

SALT VAULT PROJECT
00000257

SANDSTONE DIAGENESIS
00000246

SATELLITE IMAGERY
00000271 00000283

SAUGER - STIZOSTEDION CANADENSE
00000269

SCRUBBERS
00000141 00000213

SECONDARY ENERGY REQUIREMENTS
00000294

SEDIMENTATION
00000067 00000068 00000069 00000070 00000097 00000103 00000107 00000110 00000113 00000125

SEDIMENTOLOGY
00000245 00000246

SEMIARID CLIMATES
00000014 00000064 00000089

SEPARATION PROCESSES
00000232

SERVICE SECTOR
00000196 00000205 00000296

SEWAGE TREATMENT
00000255

SHARPTAIL GROUSE
00000078 00000149

SHERIDAN CO., MT
00000009

SHERIDAN CO., WY
00000193

SHIRLEY BASIN
00000271

SHORT PRAIRIE ECOSYSTEM
00000151

SILTING
00000259

SIMULATION MODELS
00000008 00000022 00000059 00000098 00000100 00000109 00000142 00000151 00000159 00000165 00000170
00000292

SITING STUDIES
00000001 00000062 00000102 00000156 00000172 00000233

SKYLAB EREP
00000271 00000283

SLOPE CO., ND
00000009

SLURRIES
00000221

SLURRY PIPELINES
00000118

SMALL MAMMALS
00000033 00000260

SOCIOECONOMIC IMPACT
SEE CHAPTER 1.5 AND:
00000002 00000003 00000008 00000124 00000153 00000286 00000292 00000300

SODIC SPOILS
00000020 00000037 00000052 00000055 00000056 00000057 00000083

SODIUM DIOXIDE
00000165

SOIL AMENDMENTS
00000014 00000020 00000051 00000054 00000056 00000057 00000058 00000080

SOIL ANALYSIS
00000063 00000066 00000067 00000068 00000069 00000070 00000097 00000145 00000263

SOIL PROFILES
00000060 00000061 00000062

SOIL SURVEYS
00000277

SOIL TEXTURE
00000017

SOLAR ENERGY
00000250 00000255 00000273

SOLID WASTE DISPOSAL
00000080 00000141

SOLID WASTES
00000080

SOLVENT EXTRACTION
00000006 00000234

SPAWNING HABITATS
00000157

SPOIL BANKS
00000011 00000012 00000016 00000019 00000021 00000065 00000100 00000286

SPOILS
00000014 00000017 00000018 00000020 00000022 00000023 00000024 00000025 00000026 00000028 00000029
00000031 00000032 00000033 00000034 00000035 00000037 00000038 00000042 00000044 00000052 00000056
00000057 00000058 00000059 00000060 00000061 00000074 00000077 00000077 00000078 00000079 00000080
00000081 00000082 00000083 00000093 00000096 00000260 00000261 00000262 00000264 00000265 00000269

SPOILS CHARACTERISTICS
00000012 00000014 00000022 00000038 00000039 00000048 00000053 00000054 00000055 00000085 00000096
00000269

STABILIZATION
00000034 00000035 00000072 00000259 00000261 00000262 00000269 00000286

STACK EMISSIONS
00000128 00000129 00000137 00000142 00000143 00000145 00000146 00000152 00000159 00000161 00000162
00000163 00000164 00000165 00000167 00000168 00000169 00000170 00000178 00000179 00000213

STANTON, ND
00000142

STARK CO.,ND
00000009

STATISTICAL ANALYSIS
00000106 00000110 00000148 00000156 00000220 00000228 00000244

STEAM-ELECTRIC GENERATORS
00000002 00000003 00000129 00000133 00000135 00000136 00000140 00000152 00000219

STIPULATION
00000243

STONECAT - NOTORUS FLAVUS
00000115 00000289

STORET
00000111 00000112 00000158

STREAMFLOW
00000089 00000092 00000097 00000099 00000102 00000105 00000107 00000108 00000109 00000110 00000115
00000125

STRIP MINING
00000002 00000003 00000004 00000007 00000012 00000013 00000014 00000017 00000018 00000019 00000020
00000026 00000029 00000030 00000031 00000032 00000033 00000034 00000035 00000036 00000042 00000046
00000048 00000049 00000051 00000052 00000053 00000055 00000056 00000057 00000058 00000059 00000060
00000061 00000062 00000063 00000064 00000065 00000066 00000071 00000072 00000074 00000076 00000077
00000078 00000079 00000080 00000081 00000082 00000083 00000084 00000085 00000089 00000090 00000091
00000093 00000098 00000099 00000100 00000103 00000107 00000115 00000116 00000117 00000122 00000144
00000149 00000151 00000155 00000156 00000171 00000226

SUBBITUMINOUS
00000215

SUBSOIL
00000052

SUBSURFACE RUNOFF
00000096

SULFATES
00000017 00000074 00000113

SULFIDE MINERALS
00000266

SULFONATION
00000237

SULFUR
00000134 00000135 00000136

SULFUR DIOXIDE
00000147

SULFUR DIOXIDE REMOVAL
00000141

SUPERCONDUCTORS
00000290

SURFACE MINING
00000001 00000015 00000016 00000037 00000039 00000040 00000041 00000043 00000045 00000047 00000049
00000050 00000051 00000075 00000096 00000205 00000223 00000224 00000227 00000258 00000259 00000260
00000261 00000262 00000263 00000264 00000265 00000286 00000291

SURFACE RESOURCES
00000274

SURFACE RUNOFF
00000021 00000039 00000042 00000051 00000087 00000096

SURFACE SOIL
00000052 00000055 00000056 00000060

SURFACE WATER
00000063 00000066 00000067 00000068 00000069 00000070 00000087 00000092 00000094 00000098 00000099
00000103 00000105 00000106 00000108 00000110 00000117 00000122 00000125 00000144

SURFACE-GROUNDWATER RELATIONSHIP
00000106

SURFACTANTS
00000006

SWEETGRASS CO., MT
00000254

SYSTEMS ANALYSIS
00000244 00000300

TAILINGS
00000265

TAR SANDS
00000212 00000230 00000232 00000234 00000239

TAYLOR CREEK, CO
00000070

TECHNICAL ASSISTANCE
00000182 00000184 00000191

TECHNOLOGY ASSESSMENT
00000007 00000300

TEMPERATURE INVERSIONS
00000142 00000166

TEMPORARY FACILITIES
00000190

TETON CO., WY
00000254

THERMAL EFFICIENCY
00000219

THERMAL GENERATORS
00000299

THERMAL IMAGERY
00000123

THERMAL POLLUTION
00000088

THIN-LAYER CHROMATOGRAPHY
00000006

THUNDER BASIN NATIONAL GRASSLAND
00000144

TIME-TREND CHANGES
00000035 00000262

TONGUE RIVER BASIN
00000113 00000115 00000120 00000123 00000126 00000158 00000288

TOPOGRAPHIC FEATURES
00000091

TRACE ELEMENTS
00000006 00000059 00000106 00000113 00000120 00000121 00000126 00000129 00000134 00000135 00000136
00000145 00000161 00000164 00000167 00000168 00000169 00000178 00000006 00000059 00000113 00000229

TRANSPORTATION SYSTEMS
00000223 00000227

TREASURE CO., MT
00000010

TREND-SURFACE ANALYSIS
00000091

I+CNA
00000106

UNDERGRADUATE RESEARCH
00000006

URANIUM
00000271 00000299 00000300

URBAN DEVELOPMENT
00000194

VALUES CONFLICTS
00000207 00000209

VEGETATION TYPES
00000175 00000177

VERNAL, UT
00000230

VOCATIONAL EDUCATION
00000189

WASTE DISPOSAL
00000257

WATER ANALYSIS
00000066 00000068 00000097 00000098 00000099 00000103 00000104 00000107 00000109 00000110 00000113
00000144

WATER CHEMISTRY
00000059

WATER CONSUMPTION
00000086

WATER DISCHARGE
00000104 00000107 00000110 00000289

WATER FLOW
00000122

WATER POLLUTION
00000094 00000110 00000113 00000114 00000117 00000121 00000132 00000158 00000167 00000222 00000270

WATER QUALITY
00000002 00000003 00000042 00000068 00000089 00000103 00000107 00000110 00000111 00000112 00000113
00000117 00000120 00000125 00000126 00000158 00000263 00000266

WATER RECHARGE
00000104 00000105 00000107 00000109

WATER RESOURCES
SEE CHAPTER 1.3 AND:
00000007 00000153 00000157 00000158 00000167 00000186 00000189 00000196 00000198 00000207 00000278
00000288 00000289

WATER TABLE
00000090

WATER UTILIZATION
00000002 00000003 00000104 00000106 00000119 00000207

WATER WELLS
00000090

WEATHER MODIFICATION
00000128 00000142 00000146 00000159

WEATHERING
00000023

WHEATLAND, WY
00000183 00000202 00000203

WIBAUX CO., MT
00000009

WILDLIFE
00000033 00000089 00000139 00000149 00000151 00000173 00000260 00000277 00000295

WILDLIFE HABITATS
00000031 00000032 00000045 00000078 00000149 00000150 00000173 00000177 00000254 00000258

WILLISTON BASIN
00000091 00000156

WIND ENERGY
00000248 00000253

WIND RIVER BASIN
00000271

WOODY PLANTS
00000031 00000033 00000034 00000261

YELLOWSTONE CO., MT
00000010

YELLOWSTONE GEOTHERMAL REGION
00000249

YELLOWSTONE RIVER BASIN
00000009 00000086 00000095 00000123 00000124 00000126 00000158 00000207 00000288

YOUNGS CREEK, MT
00000155